OK6410-B

Linux User Manual

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Chapter 1 Preface

Thanks for selecting the “Forlinx embedded”products .

Since the establishment in the year of 2006, Forlinx Company has provided more than 10,000 sets of development platform for customers,dedicates itself to help new learners to cross the threshold of embedded, provide reference for engineers to design products. We mainly focus on the construction, establishment, transplanting and upgrading of the embedded development platform and have made our great efforts to simplify the study and development of the embedded system.

Linux is the first choice for embedded system learners in their first stage. It is an open-source project which could help learners gradually know about the essence of embedded operation system through study and operation.At the same time, it is a successful software platform that has been widely applied in every industry.

The development of the embedded system also has been reflected in the continuous update in the hardware technology. Two years ago, ARM9 was first choice in the engineers' products design , but at present, ARM11 start to stand out conspicuously and would be applied widely in the next few years, will become the leading role in the study and development of the embedded technology.

S3C6410 is designed on the basis of ARM11 kernel. It is not only advanced in the speed, but also has study and development value in other advanced function.

OK6410 is a study and development kit which is cost effective and with high configuration. We did enough preparation for its publishment. It has a lot of interfaces and is equipped with many development modules,such as CMOS camera modules, WIFI wireless modules for the customer’s selection.

This manual mainly introduce the construction and development of Linux system on the OK6410 development board.It does not contain basic operation knowledge due to limited space, we suggest you could study it combining with more professional Linux books or other CD materials.

Up to now, this manual has been modified many times, but there are still much disappointments which could not make everyone feels satisfied, please send us your precious views and suggestions. At the same time, we will continuously update and perfect it and will put them on customer service section on our website for your downloading.

At last, we hope you all could study and work with happiness.

Chapter2 Linux’s one-key infusion

●What is Linux’s one-key infusion? Why to do it?
Simply speaking, Linux is quickly infused into the NandFlash of the board after a series of operation by using SD card and programs and system images provided by Forlinx Company.
What kinds of problems could be resolved? For example,
1.When leaving the factory, WinCE6.0 is the default system which has been infused in the board. If you hope OK6410 could run the Linux system, then you need to reinfuse the Linux system into the NandFlash in the board.

2.Update uboot,kernel（zImage),one or more files in the file system（Yaffs2 file system）.

3.The board can not be started due to various reasons.

Note：Please use the SD card+USB card reader when infusing! TF card +Micro SD+ card reader is not recommended!Furthermore, we suggest you use the 4G ScanDisk or 4G Kingston SD card. Of course, it is OK if you have other types of SD card which could complete the system infusion. If you could not successfully complete the infusion, you'd better use the SD card that we recommended to you.

●After introducing the use of Linux’s one-key infusion, we begin to tell you detailed procedures that adding the Linux into board through one-key infusion.
Before infusion, please prepare a SD card and a SD card reader at first.

Necessary File paths in this chapter:

File name	**Paths in the CD**
SD_Writer.exe(PC infusion tool)	CD\Linux-3.0.1\Linux sdfuse tools\
mmc_ram128.bin(sdboot,suitable for board with 128M memory,is used for the SD card boot)	CD\Linux-3.0.1\Linux sdfuse tools\
mmc_ram256.bin(sdboot,suitable for board with 256M memory, is used for the SD card boot))	CD\Linux-3.0.1\Linux sdfuse tools\
u-boot_ram128.bin(uboot image，which is suitable for the board with128M memory)	CD\Linux-3.0.1\demo\
u-boot_ram256.bin(uboot image，which is suitable for the board with256M memory)	CD\Linux-3.0.1\demo\
zImage(kernel image)	CD\Linux-3.0.1\demo\

rootfs.yaffs2-nand256m(it is used in yaffs2 file system which supports touch screen input,is suitable for the board with 256M,1Gbyte nandflash)	CD\Linux-3.0.1\filesystem\
rootfs.yaffs2-nand2g(it is used in yaffs2 file system which supports touch screen input,is suitable for the board with 4G byte nandflash)	CD\Linux-3.0.1\filesystem\
DNW(serial port, USB port tool)	CD\Utilites\

2-1 Special instruction when infusing Linux system.

Before infusing Linux, if the board is installed with WinCE system (WinCE system is the default system which has been infused in the board when leaving the factory),you must start the Eboot to clear the NandFlash.

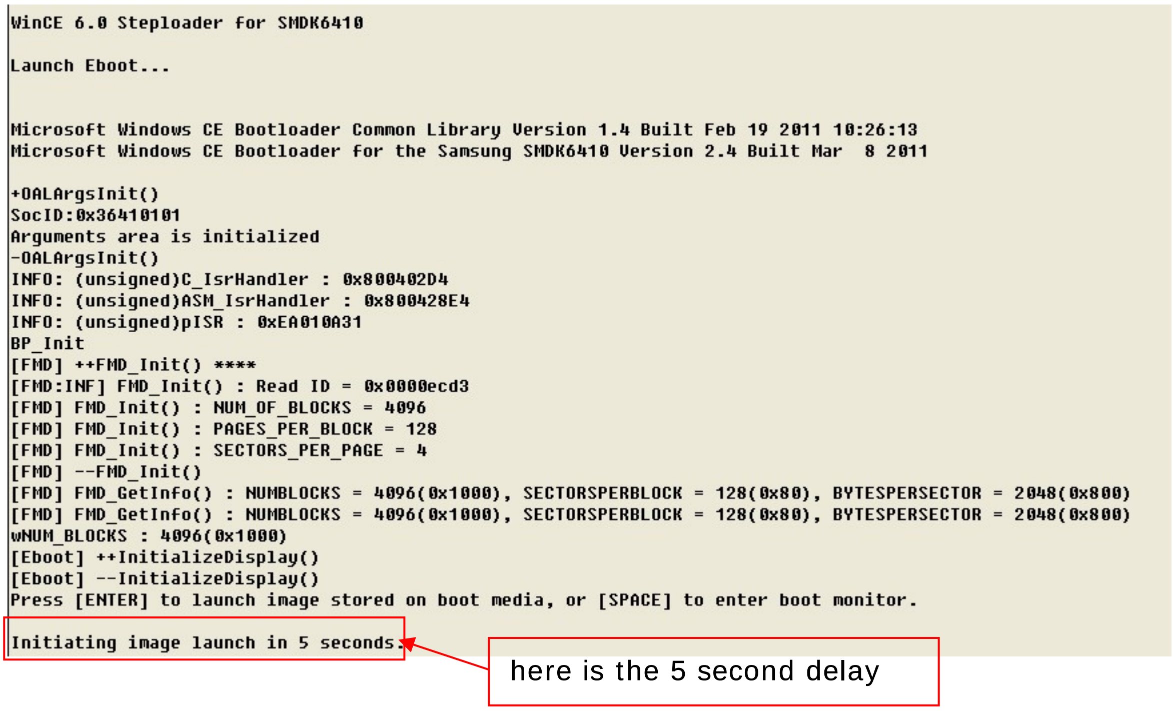
Note：This chapter is only be used for the replacement from WinCE to Linux system.
If the Eboot can not be started, then it should be infused into board at first. When infusing Eboot, users need to check Chapter1-chaper3 of “Forlinx 6410 board WinCE 6.0 user manual” in pdf format for reference.

Linux infusion could be operated only after NandFlash is erased by Eboot, the reason is:file format.

The default system of the Forlinx6410 board is WinCE.When designing the WinCE system, Microsoft company made a rule,which set up the first four modules as broken ones, that is to say, bootloader partitions are all marked as bad blocks to prevent be erased by WinCE application system, so that we need to recover these “false bad blocks” when replacing WinCE system by Linux system in the board.
Eboot methods for erasing NandFlash:

Step1. Connect COMO in the board and PC serial port with a serial cable, and then open and set up the DNW software (Appendix: Simple usage course of DNW software).

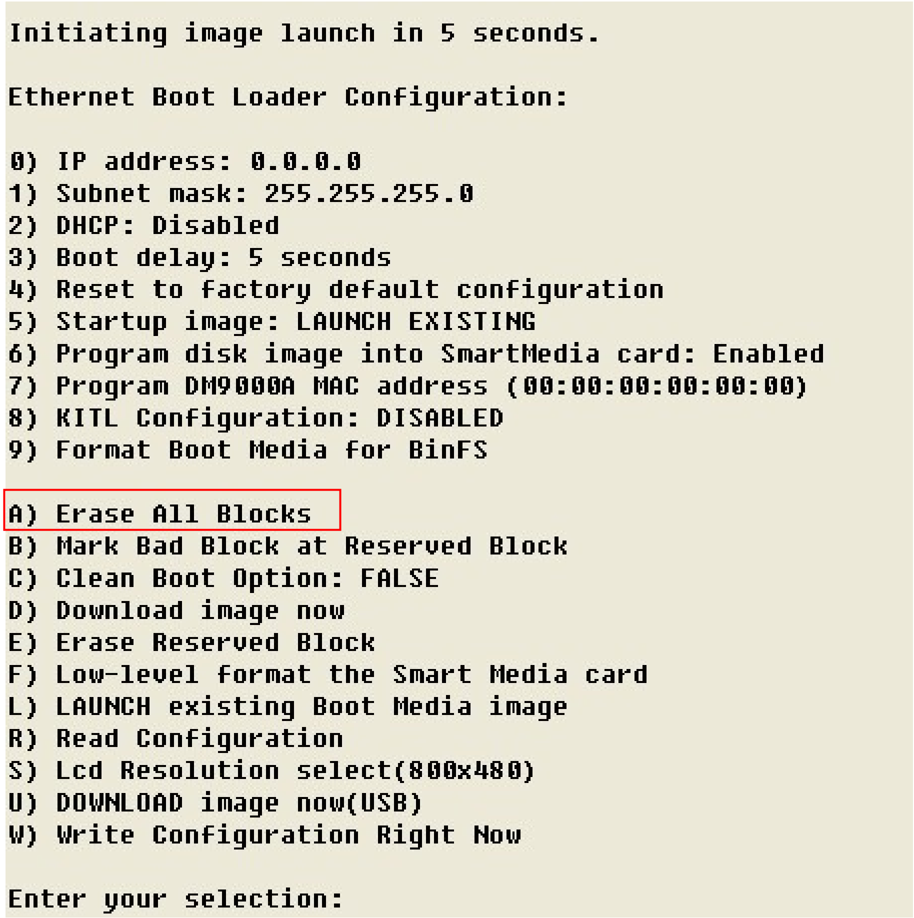
Step2. Power on the board, press the space key o stay in the Eboot status after “initiating image launch in 5 seconds”appears.



```
WinCE 6.0 Steploader for SMDK6410

Launch Eboot...


Microsoft Windows CE Bootloader Common Library Version 1.4 Built Feb 19 2011 10:26:13
Microsoft Windows CE Bootloader for the Samsung SMDK6410 Version 2.4 Built Mar  8 2011

+OALArgsInit()
SocID:0x36410101
Arguments area is initialized
-OALArgsInit()
INFO: (unsigned)C_IsrHandler : 0x800402D4
INFO: (unsigned)ASM_IsrHandler : 0x800428E4
INFO: (unsigned)pISR : 0xEA010A31
BP_Init
[FMD] ++FMD_Init() ****
[FMD:INF] FMD_Init() : Read ID = 0x0000ecd3
[FMD] FMD_Init() : NUM_OF_BLOCKS = 4096
[FMD] FMD_Init() : PAGES_PER_BLOCK = 128
[FMD] FMD_Init() : SECTORS_PER_PAGE = 4
[FMD] --FMD_Init()
[FMD] FMD_GetInfo() : NUMBLOCKS = 4096(0x1000), SECTORSPERBLOCK = 128(0x80), BYTESPERSECTOR = 2048(0x800)
[FMD] FMD_GetInfo() : NUMBLOCKS = 4096(0x1000), SECTORSPERBLOCK = 128(0x80), BYTESPERSECTOR = 2048(0x800)
wNUM_BLOCKS : 4096(0x1000)
[Eboot] ++InitializeDisplay()
[Eboot] --InitializeDisplay()
Press [ENTER] to launch image stored on boot media, or [SPACE] to enter boot monitor.

Initiating image launch in 5 seconds.
```

here is the 5 second delay

Step3. Press 'A' to erase NandFlash.



```
Initiating image launch in 5 seconds.

Ethernet Boot Loader Configuration:

0) IP address: 0.0.0.0
1) Subnet mask: 255.255.255.0
2) DHCP: Disabled
3) Boot delay: 5 seconds
4) Reset to factory default configuration
5) Startup image: LAUNCH EXISTING
6) Program disk image into SmartMedia card: Enabled
7) Program DM9000A MAC address (00:00:00:00:00:00)
8) KITL Configuration: DISABLED
9) Format Boot Media for BinFS

A) Erase All Blocks
B) Mark Bad Block at Reserved Block
C) Clean Boot Option: FALSE
D) Download image now
E) Erase Reserved Block
F) Low-level format the Smart Media card
L) LAUNCH existing Boot Media image
R) Read Configuration
S) Lcd Resolution select(800x480)
U) DOWNLOAD image now(USB)
W) Write Configuration Right Now

Enter your selection:
```

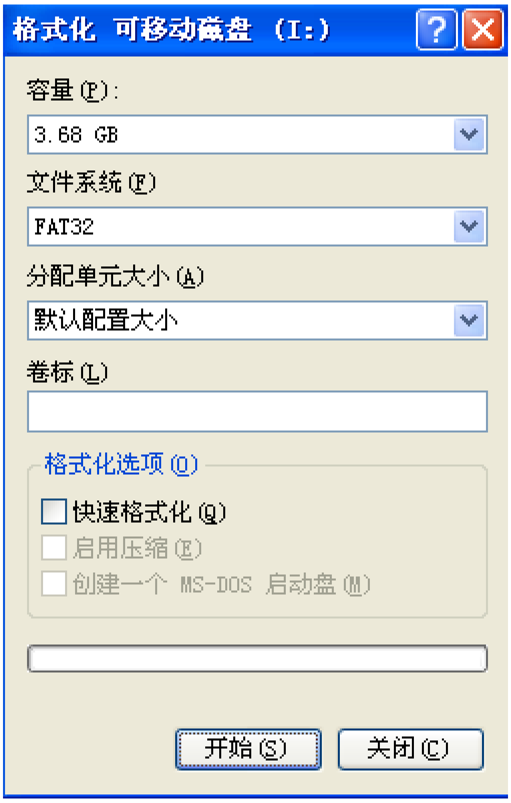
After a series of operation introduced in this chapter, you can start to infuse the Linux system.

2-2 Making SD card for Linux’s one key infusion

Step1. SD card is formatted as FAT32 format.

Connect SD card with SD card reader, and then plug the SD card reader into the PC USB port.

Format the SD card as FAT32 format when the SD card is recognized.



格式化 可移动磁盘 (I:)

容量(P): 3.68 GB

文件系统(F): FAT32

分配单元大小(A): 默认配置大小

卷标(L):

格式化选项(O)

□ 快速格式化(Q)

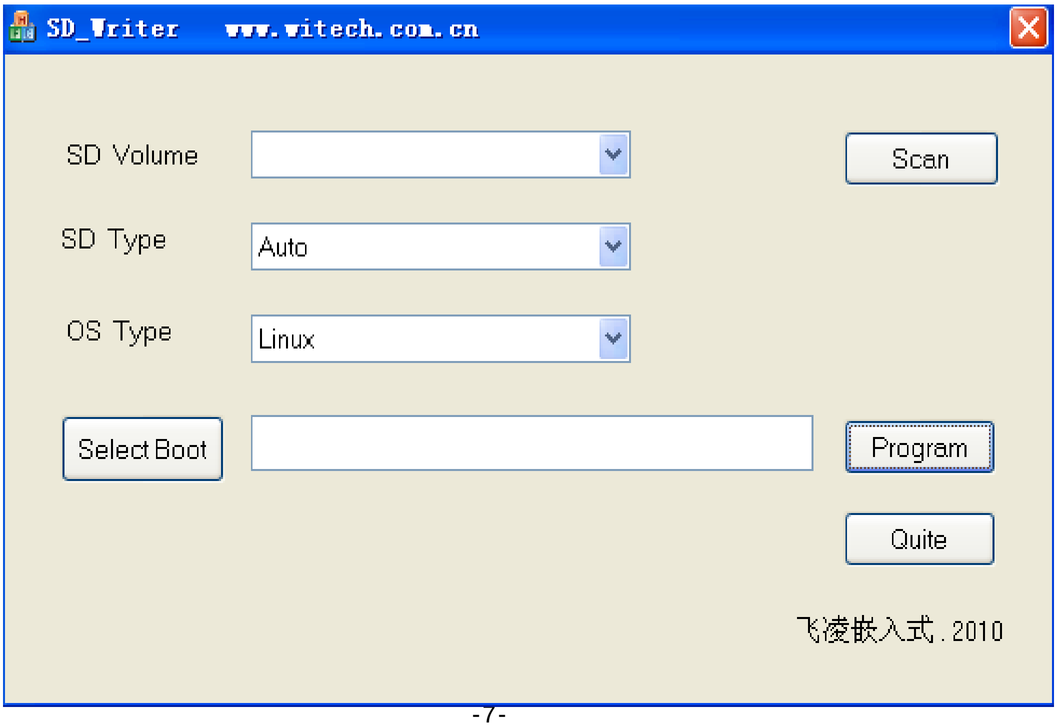
□ 启用压缩(E)

□ 创建一个 MS-DOS 启动盘(M)

Step2. Infuse mmc.bin into the SD card through SD_Writer.exe

Open SD_Writer.exe

The following picture is an SD_Writer.exe screenshot in XP system.



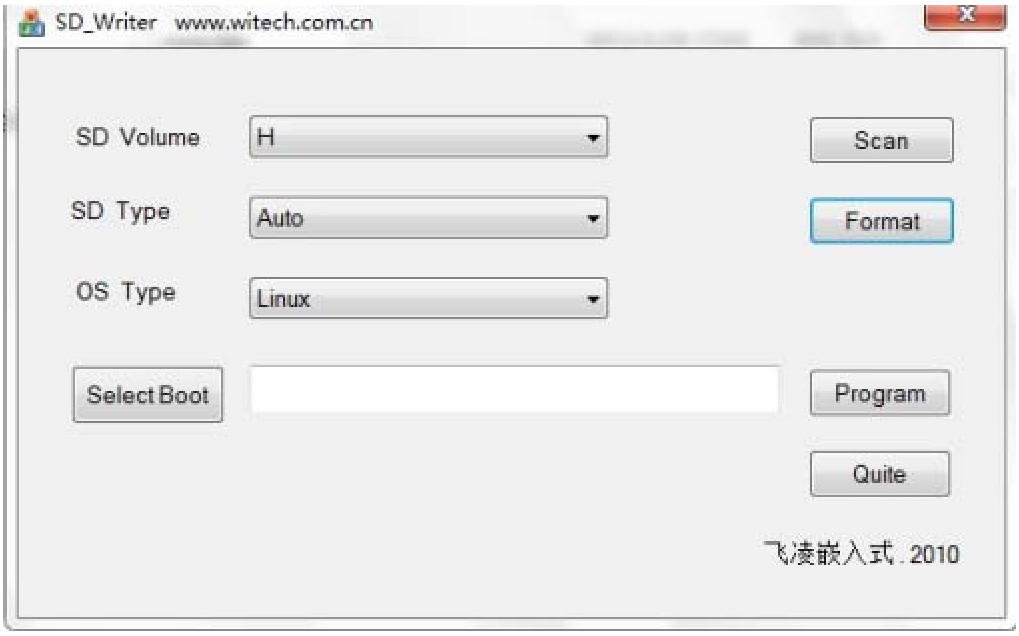
SD_Writer www.witech.com.cn

SD Volume:

SD Type: Auto

OS Type: Linux

The following picture is an SD_Writer.exe screenshot in the system of WIN7.



SD Volume H

SD Type Auto

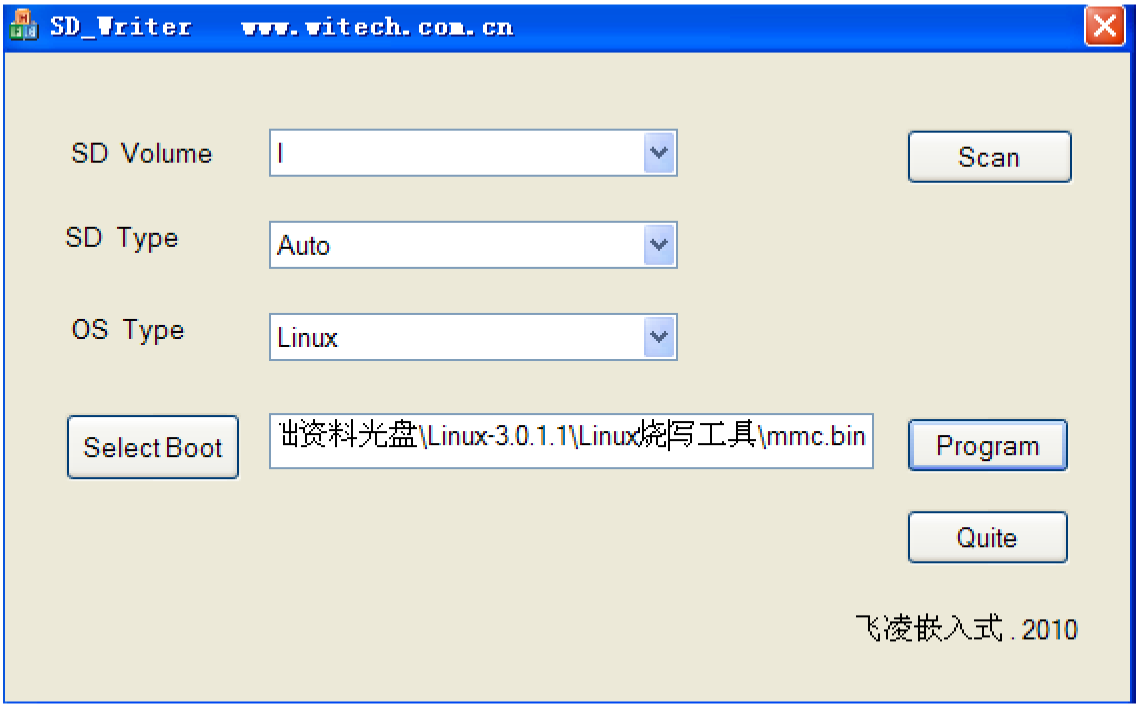
OS Type Linux

Step3. Click"Scan"，this step is to automatically search for the drive letter of SD card. If "scan" does not properly set up the driver letter of SD card, you need to manually adjust SD Volume, adjust drive letter as the drive letter of SD card.(for example, the USB port connects with two or more USB disks or SD cards, and then the SD card drive letter may be scanned by mistake.)

Step4. Adjust"SD Type" as auto, so that SD_Writer could automatically identify the type of SD card.
if you PC is installed with WIN7, you need to click"format"to format the SD card. XP customers can not find"format" and also do not need it. This is the only difference to XP and WIN7 customers.

Step5. Click"OS Type", select "Linux". This step is to select the infusion system type.

Step6. Click"Select Boot", select mmc.bin which is suitable for your board
mmc.binmmc_ram128.bin is suitable for the board with 128M memory
mmc_ram256.bin is suitable for the board with 256M memory



SD_Writer www.witech.com.cn

SD Volume: I

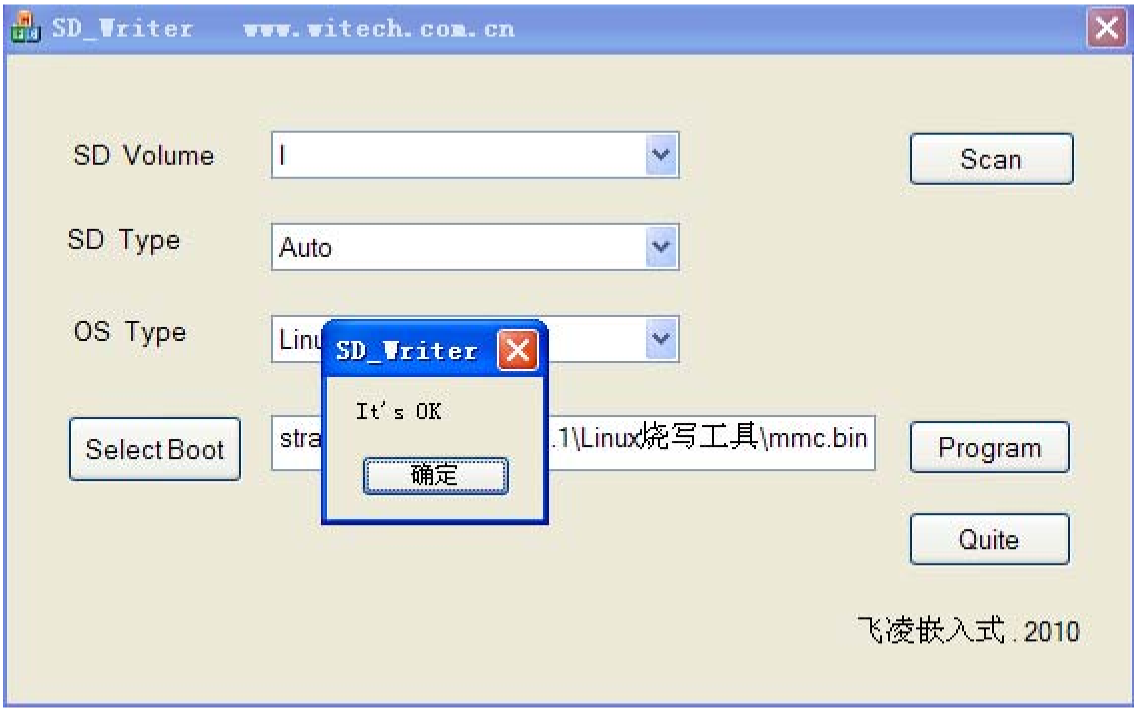
SD Type: Auto

OS Type: Linux

出资料光盘\Linux-3.0.1.1\Linux烧写工具\mmc.bin

飞凌嵌入式 . 2010

Step7. Click"Program", if the screen shows"It's OK", it means the operation is completed. The successful ending will be shown in next picture.



SD_Writer www.witech.com.cn

SD Volume: I

SD Type: Auto

OS Type: Linu

stra .1\Linux烧写工具\mmc.bin

SD_Writer

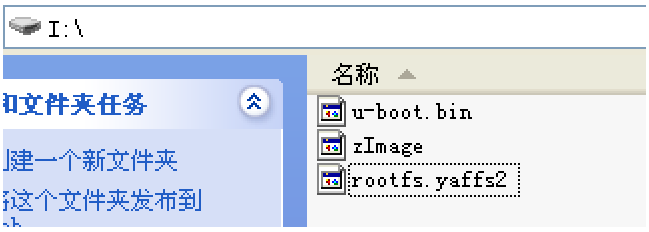
It's OK

飞凌嵌入式 . 2010

Step8. click"OK", and then click"Quite". Quit from SD_Writer.exe.

Step9. At first, copy u-boot.bin into SD card.

U-boot_ram128.bin is specially used for the board with 128M memory
U-boot_ram256.bin is specially used for the board with 256M memory
Copy corresponding u-boot to the SD card , the u-boot should be named as u-boot.bin in the SD card.
And then copy zImage into SD card. ZImage is the kernel image file of Linux.
Finally, copy and paste rootfs.yaffs2 to the SD card.
rootfs.yaffs2-nand256m is specially used for the board with 128M memory
rootfs.yaffs2-nand2g is specially used for the board with 256M memory
Send the copy of corresponding yaffs2 into SD card and rename it as rootfs.yaffs2.
After above operating steps, corrected files and file names are shown as follows:



Note: PC system has a function to hide the suffix of existing file names.If this function is started in PC, and then the u-boot.bin will be just found as” u-boot”. When editing this manual, editors have closed this function in the PC.

2-3 Infused Linux into the NandFlash of the board.

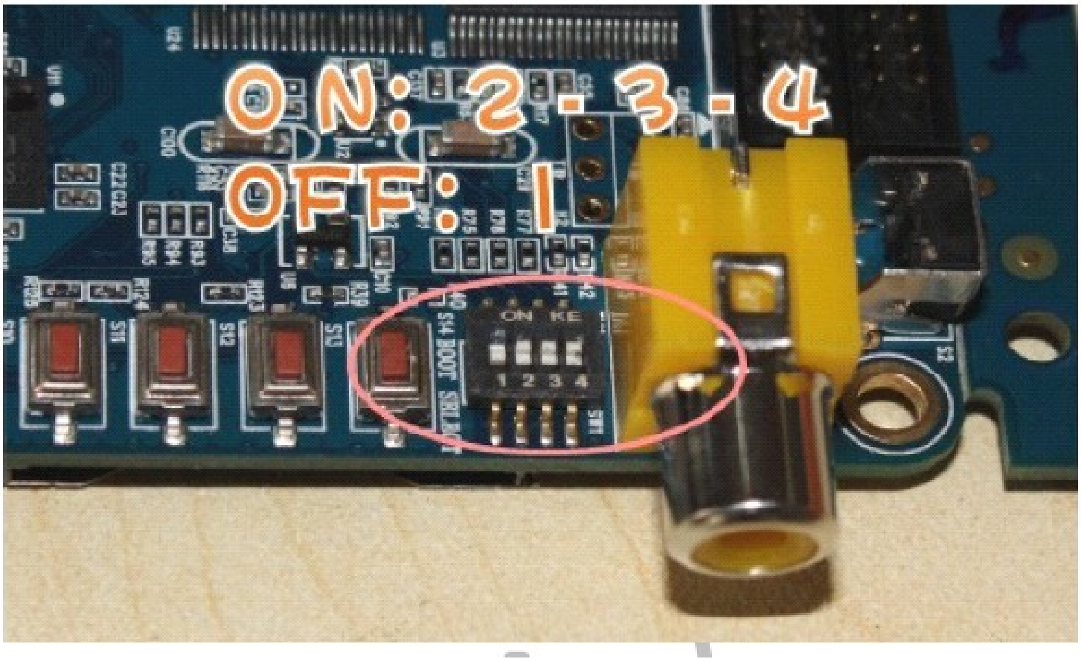
Step1. Put the well prepared SD card into the SD slot.

Step2. Connect with 5V DC power plug (Forlinx provides this power adapter, you'd better use the power adapter provided by Forlinx)

Step3. Set up DIP switch to start from SD card
DIP switch setting is as follows:

Pin No.	Pin 4	Pin 3	Pin 2	Pin 1
Start from SD card	1	1	1	0

Note:In the above table, 1 represents dial-up need to be switched to” On”, o shows that dial-up need to be switched to “Off”.
When switching the ON/OFF, the switch should be triggered to the proper position, if it is improperly be operated,bad contact will lead to the failure of the infusion.
setting should be like the next picture:

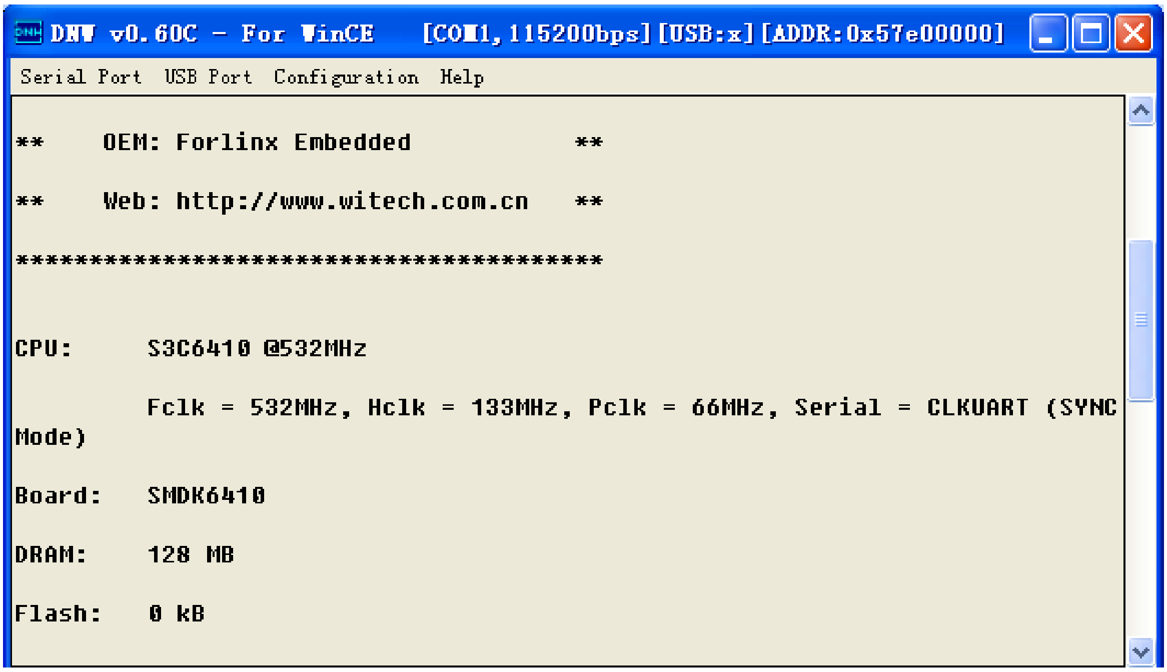


Step4. Connect the COMO in the board and the PC serial port with a piece of serial cable.

Step5. Open the DNW software,set up the serial port of DNW.

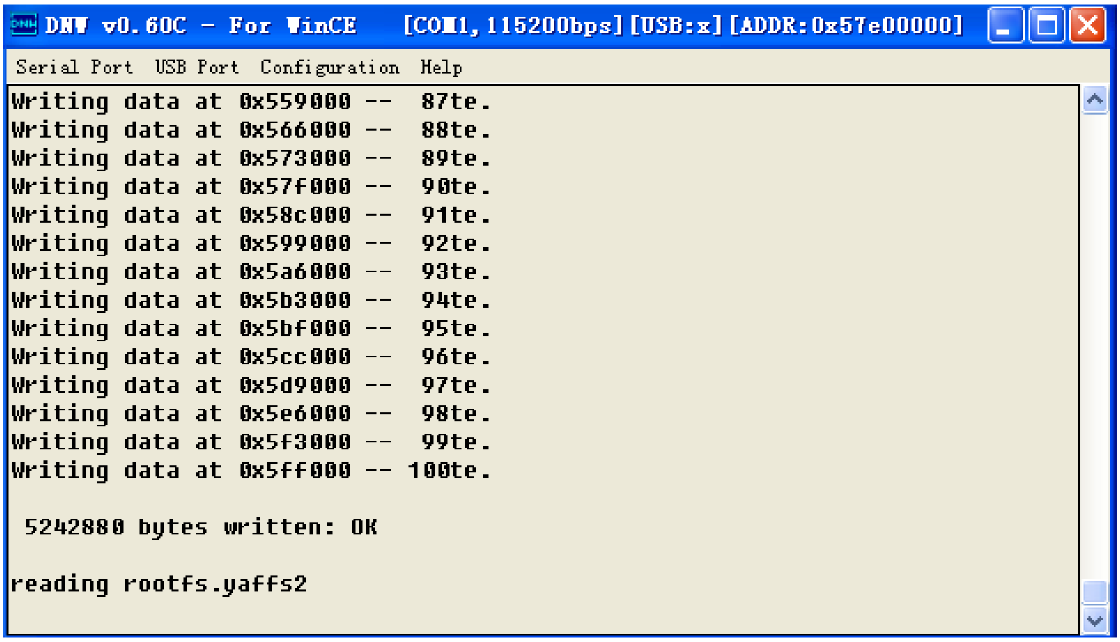
Step6. Power on the board, the serial information will be shown as the following Picture.Because of too much information, we just show you the information at its first and last phase.

The first phase:


DNW v0.60C - For WinCE [COM1,115200bps][USB:x][ADDR:0x57e00000]
Serial Port
USB Port
Configuration
Help

```
**     OEM: Forlinx Embedded           **

**     Web: http://www.witech.com.cn   **

****************************************


CPU:     S3C6410 @532MHz

         Fclk = 532MHz, Hclk = 133MHz, Pclk = 66MHz, Serial = CLKUART (SYNC
Mode)

Board:   SMDK6410

DRAM:    128 MB

Flash:   0 kB
```

The last phase:


DNW v0.60C - For WinCE [COM1,115200bps][USB:x][ADDR:0x57e00000]
Serial Port USB Port Configuration Help

```
Writing data at 0x559000 --  87te.
Writing data at 0x566000 --  88te.
Writing data at 0x573000 --  89te.
Writing data at 0x57f000 --  90te.
Writing data at 0x58c000 --  91te.
Writing data at 0x599000 --  92te.
Writing data at 0x5a6000 --  93te.
Writing data at 0x5b3000 --  94te.
Writing data at 0x5bf000 --  95te.
Writing data at 0x5cc000 --  96te.
Writing data at 0x5d9000 --  97te.
Writing data at 0x5e6000 --  98te.
Writing data at 0x5f3000 --  99te.
Writing data at 0x5ff000 -- 100te.

 5242880 bytes written: OK

reading rootfs.yaffs2
```

Note: After infusion, the buzzer will give sound warning. If there is no warning, the infusion is not successful, and the infusion progress will be shown on the 4.3-inch LCD. If you are using the 4.3-inch LCD, there is no need for the DNW to display the infusion information.

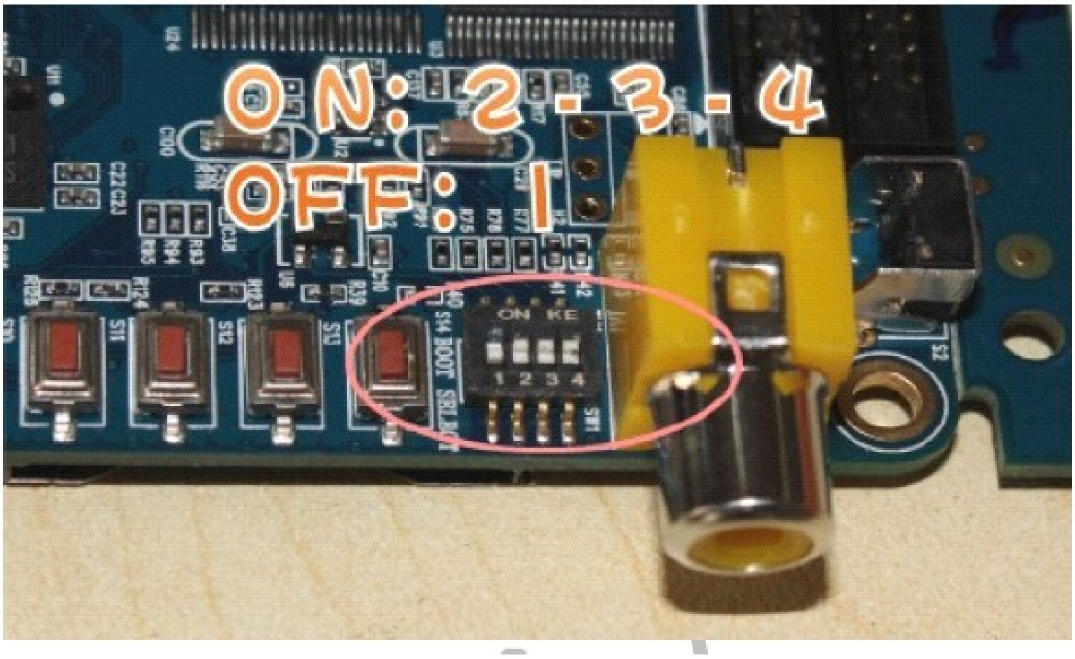
Step7. Power off the board,set up DIP switch to start from the nandflash.

Pin No.	Pin 4	Pin 3	Pin 2	Pin 1
Start from SD card	0	0	1	0

Note: In the above table, 1 represents dial-up need to be switched to” On”, o shows that dial-up need to be switched to “Off”.

When switching the ON/OFF, the switch should be triggered to the proper position, if it is improperly be operated,bad contact will lead to the failure of the infusion.

Set up to start from the nandflash.



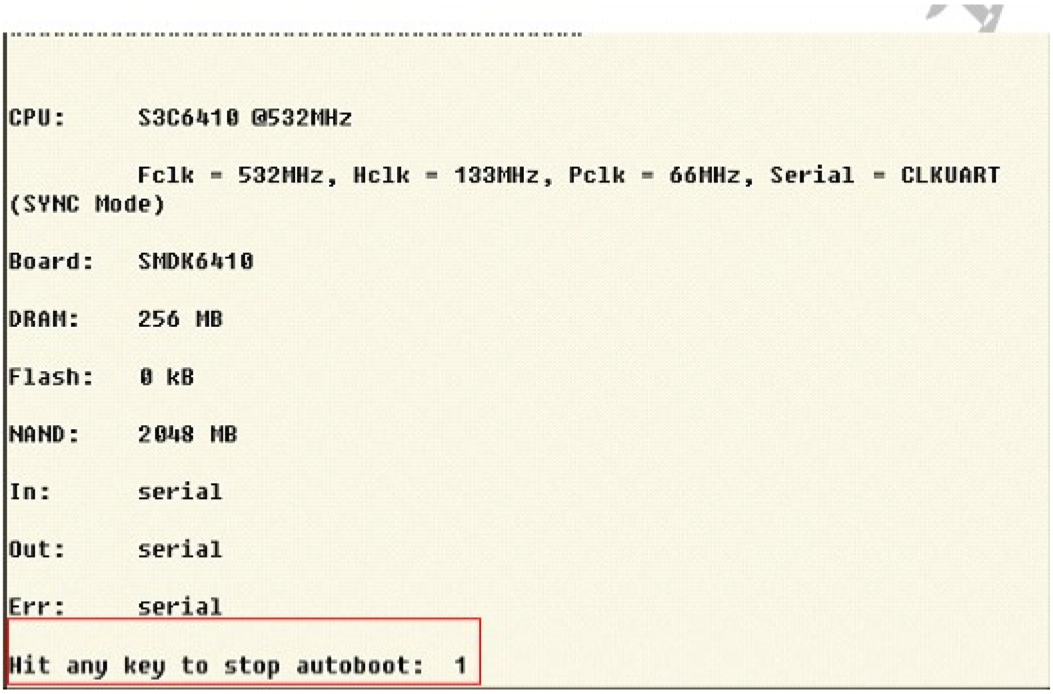
Step8. Restart the power, then the Linux system will start and work..

●What would you do if there are bad blocks?
As for the disposal of the bad blocks: occurrence of some bad blocks is unavoidable in the time of using of NandFlash. Do not worry about it! Normal bad blocks could be disposed by Forlinx board 6410 itself. Forlinx board 6410 has a set of perfect disposal mechanism for bad blocks. (Source code could be found in NAND driver)

If the Linux operation system could not be started because of bad blocks,and then you need to find a way to solve these logic bad blocks(the bad blocks may not really work well). The failed starting caused by logic bad blocks could be disposed according to next steps:

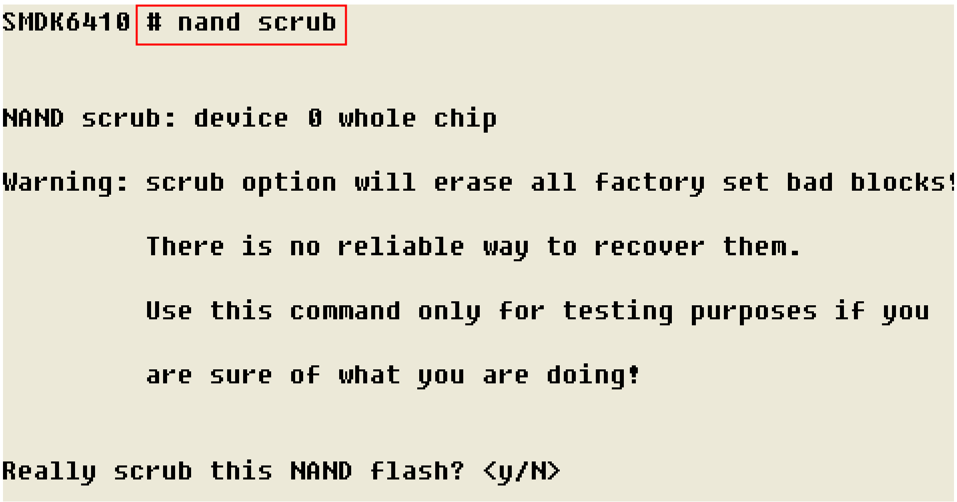
Step1. Connect COMO in the board and PC serial port through serial port cable,open and set up DNW software.

Step2. Power on the board, press the space key in the PC keyboard and stay in the Eboot status after you find out DNW software occurring “hit any key to stop autoboot:1”. Because there is only 1 second, so that pressing the space key should be done within a very short period of time.



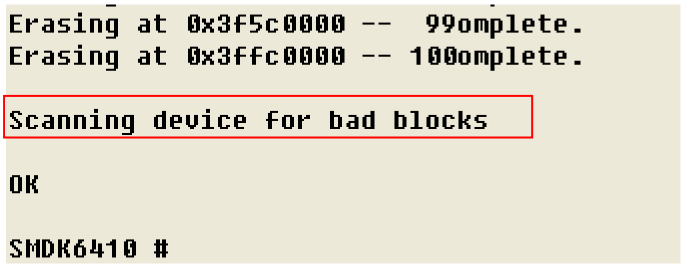
```
CPU:     S3C6410 @532MHz

         Fclk = 532MHz, Hclk = 133MHz, Pclk = 66MHz, Serial = CLKUART
(SYNC Mode)

Board:   SMDK6410

DRAM:    256 MB

Flash:   0 kB

NAND:    2048 MB

In:      serial

Out:     serial

Err:     serial

Hit any key to stop autoboot:  1
```

Step3. Type # nand scrub under uboot status.



```
SMDK6410 # nand scrub

NAND scrub: device 0 whole chip

Warning: scrub option will erase all factory set bad blocks!

         There is no reliable way to recover them.

         Use this command only for testing purposes if you

         are sure of what you are doing!

Really scrub this NAND flash? <y/N>
```

Step4. Type “y”, but “y”will not be displayed in the DNW, press the “enter“key, wait serval seconds, the bad blocks will be scrubbed.



```
Erasing at 0x3f5c0000 --  99omplete.
Erasing at 0x3ffc0000 -- 100omplete.

Scanning device for bad blocks

OK

SMDK6410 #
```

At this time, NandFlash in the whole board will be cleaned up, the bad blocks are also been disposed, and you could reinfuse Linux system through one key operation.

Note: During the process of development and study, logic bad blocks will unavoidably occur; please dispose them using the foresaid methods. However the nand scrub order should not often be used which will make false calibration to nand. These bad blocks are one kind of the characteristics of the nand. If you are really interest in it, you could further study properties of nand and Forlinx 6410 disposal mechanism for nand.

Chapter3 Test Linux-3.0.1

This chapter mainly introduces Forlinx 6410 Linux-3.0.1 drive and relevant service test, we suggest you use hyper terminal as the console.

In this chapter, if there are no special instructions, commands should be operated at the control terminal of the board. Adding '#'in the front of each command is to tell you the beginning of each order.

3-1 Switching among Qtopia2.2.0,QT-Extended-4.4.3,QT/E-4.7.1.

After the board is infused with Linux system, Qtopia2.2.0 is the default starting system. In the terminal of the board, methods for switching among all kinds of QT interfaces are as follows:

1.Switch to Qtopia2.2.0：

```
#qtopia &
```

2.Switch to QT-Extended-4.4.3：

```
#qtopia4 &
```

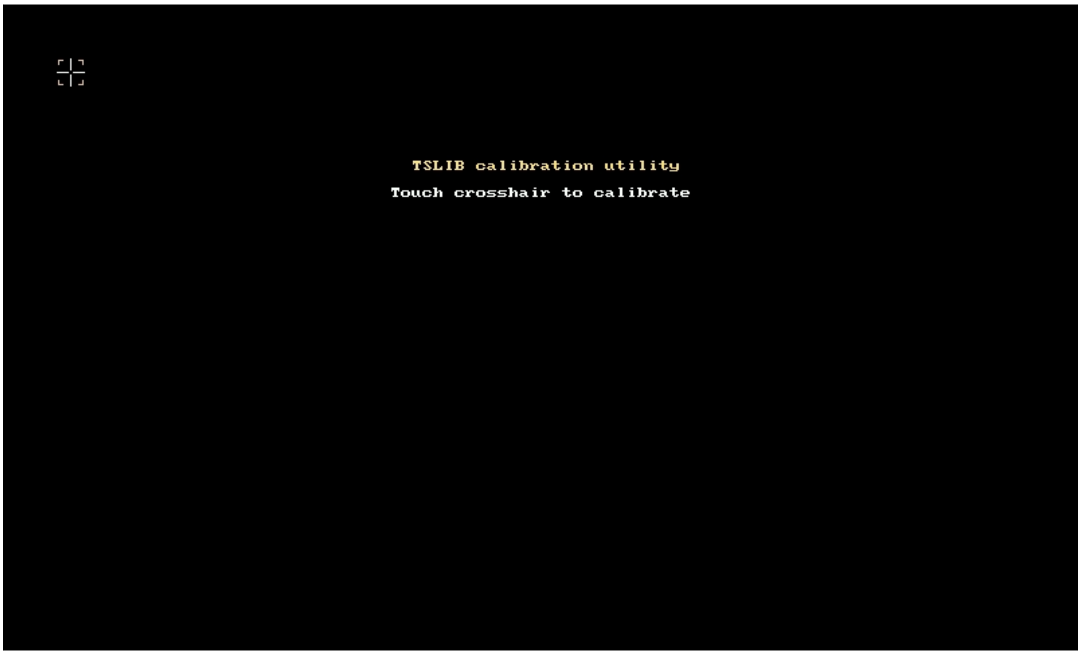
3.Switch to QT/E-4.7.1：

```
#qt4 &
```

Notes: Qtopia4.4.3 is not involved in the file systems rootfs.yaffs2 published at this time, but we will provide the compiled compressed packet Qtopia4.4.3.tar.gz in the CD. If you want to run it, use SD card or USB to copy and decompress Qtopia4.4.3.tar.gz under the /opt index, then run qtopia4 & in the hyper terminal or DNW software.

3-2 Calibration and recalibration of the touch screen

After reinfusing root system, restart the system, a tslib calibration interface will appear in front of your eyes.



TSLIB calibration utility
Touch crosshair to calibrate

Calibration method: Using touch pen to successively click the center of ⌖ on the screen. Click 5 times, spots that been touched are in different places. After 5 times click, tslib will generate a pointercal file under the root system/etc. Pointercal is the calibration information file.

Note: you need to try hard to successively click the center of ⌖ on the screen during calibration. Click 5 times would pass the calibration, but calibration datas in the generated pointercal are not right.

Recalibration method: after deleting this file, restart board,the system will enter into tslib calibration program.commands are as follows:

#rm /etc/pointercal （Delete this calibration file）
#reboot （Restart the board）

Note: QTE could not support mouse and touch screen at the same time. Touch screen Calibration will not go on under the file system which supports the mouse operation.
Path of tslib Source code:CD\QTE 移植教程与源码\tslib.tar.gz.

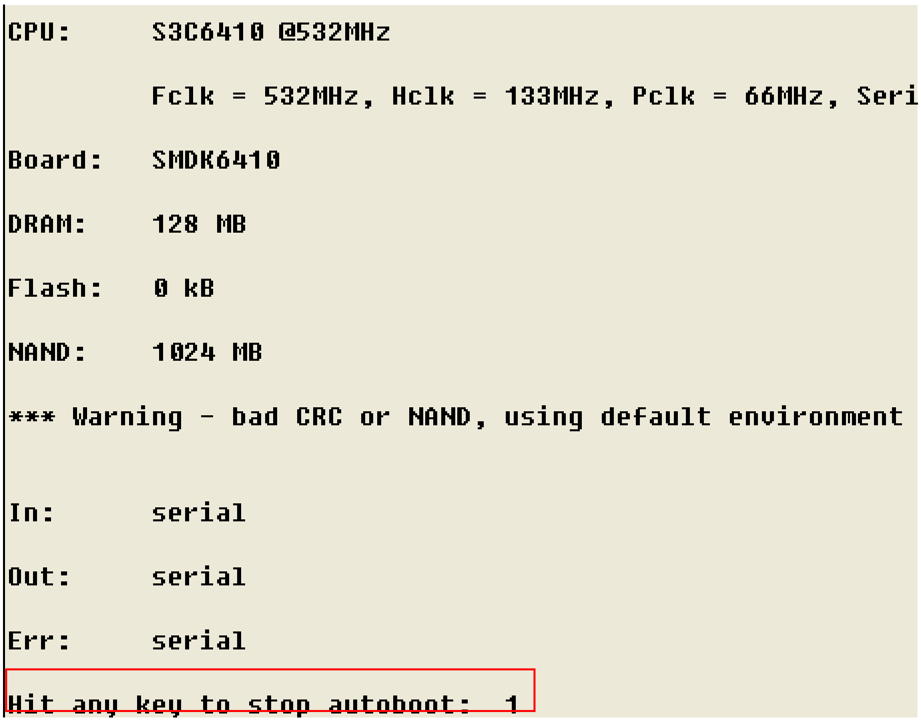
3-3 Modify LCD resolution

Modification of the resolution of LCD should be realized by the way of modifying uboot parameters. The truth is to load corresponding LCD drive according to uboot parameters.

Step1. Making sure that the system could start the uboot of Forlinx. If it fails to start, please check the foreside infusion procedures.

Step2. Connect COMO in the board and serial port in PC with serial port cable, open and set up DNW software.

Step 3. Power on the board, press the space key to stay in the Eboot status after you find out starting system occurring "hit any key to stop autoboot:1". Because there is only 1 second, so that pressing the space key in a very short time is requested.



```
CPU:     S3C6410 @532MHz
         Fclk = 532MHz, Hclk = 133MHz, Pclk = 66MHz, Seri
Board:   SMDK6410
DRAM:    128 MB
Flash:   0 kB
NAND:    1024 MB
*** Warning - bad CRC or NAND, using default environment

In:      serial
Out:     serial
Err:     serial
Hit any key to stop autoboot:  1
```

Step 4.

(Case 1) Execute the following commands to set up parameters of 3.5-inch touch screen.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200 lcdsize=35"
```

(This is one piece of command which were written in two lines because of limit of length, please do not press "space" key and "enter" key before the second line.)

#saveenv （save parameters in the Nandflash)

#reset (uboot commmand for restarting the board)

(Case 2) Execute the following commands to set up parameters of 4.3-inch touch screen.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200
lcdsize=43"
```

(This is one piece of command which were written in two lines because of limit of length, please do not press “space” key and “enter” key before the second line.)

```
#saveenv     (save parameters in the Nandflash)
#reset       (uboot command for restarting the board)
```

(Case 3) Execute the following commands to set up parameters of 5.6-inch touch screen.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200
lcdsize=56"
```

(This is one piece of command which were written in two lines because of limit of length, please do not press “space” key and “enter” key before the second line.)

```
#saveenv    (save parameters in the Nandflash)
#reset      (uboot command for restarting the board)
```

(Case4) Execute the following commands to set up parameters of 7.0-inch touch screen.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200
lcdsize=70"
```

(This is one piece of command which were written in two lines because of limit of length, please do not press “space” key and “enter” key before the second line.)

```
#saveenv     (save parameters in the Nandflash)
#reset       (uboot command for restarting the board)
```

(Case5) Execute the following commands to set up VGA output parameters of Forlinx 800X600 resolution.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200
lcdsize=VGA800"
```

(This is a piece of command which were written in two lines because of limit of length, please do not press “space” key and “enter” key before the second line.)

```
#saveenv     (save parameters in the Nandflash)
#reset       (uboot command for restarting the board)
```

(Case6) Execute the following commands to set up parameters of 8.0-inch touch screen.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200
lcdsize=VGA800"
```

(This is one piece of command which were written in two lines because of limit of length, please do not press “space” key and “enter” key before the second line.)

```
#saveenv     (save parameters in the Nandflash)
#reset       (uboot command for restarting the board)
```

Note: The setting methods of 10.4-inch LCD,8-inch LCD and VGA output of Forlinx 800X600 are same. They all need to select the lcd size:VGA800, the system can not support VGA output and LCD display at the same time.

(Case7) Execute the following commands to set up resolution parameters of HDMI modules.

```
#setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200
lcdsize=XGA1024"
```

(This is one piece of command which were written in two lines because of limit of length, please do not press “space” key and “enter” key before the second line.)

#saveenv (save parameters in the Nandflash)

#reset (uboot command for restarting the board)

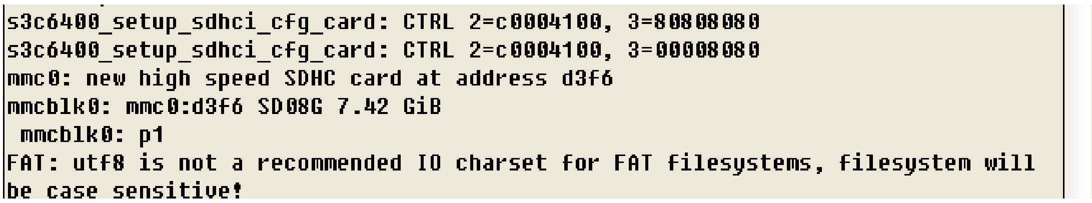
3-4 SD/MMC card driver test

SD card Hot plug is permitted in the board, put the SD card into the slot, it will be automatically mounted to the directory of /sdcard.

8G SD cards are supported in present test, cards that more than 8G has not been tested.

Physical connection picture:

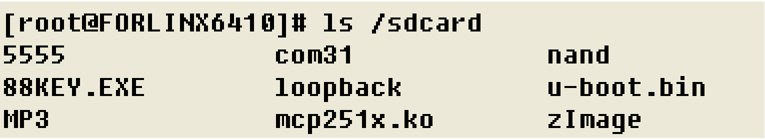
Terminal will simultaneously print information of SD card; the information displayed will be different due to variety of cards.



```
s3c6400_setup_sdhci_cfg_card: CTRL 2=c0004100, 3=80808080
s3c6400_setup_sdhci_cfg_card: CTRL 2=c0004100, 3=00008080
mmc0: new high speed SDHC card at address d3f6
mmcblk0: mmc0:d3f6 SD08G 7.42 GiB
 mmcblk0: p1
FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will
be case sensitive!
```

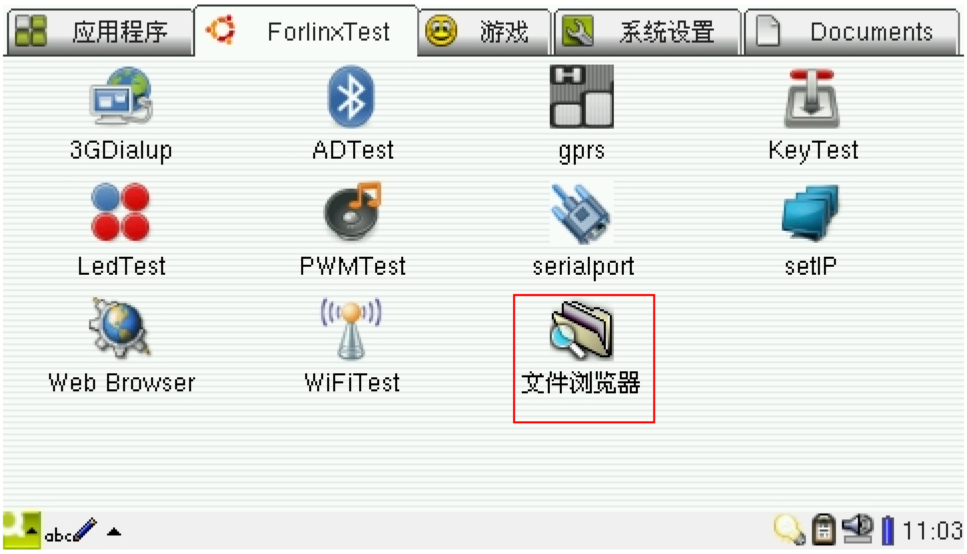
Check files in the SD card, command is as follows:

#ls /sdcard

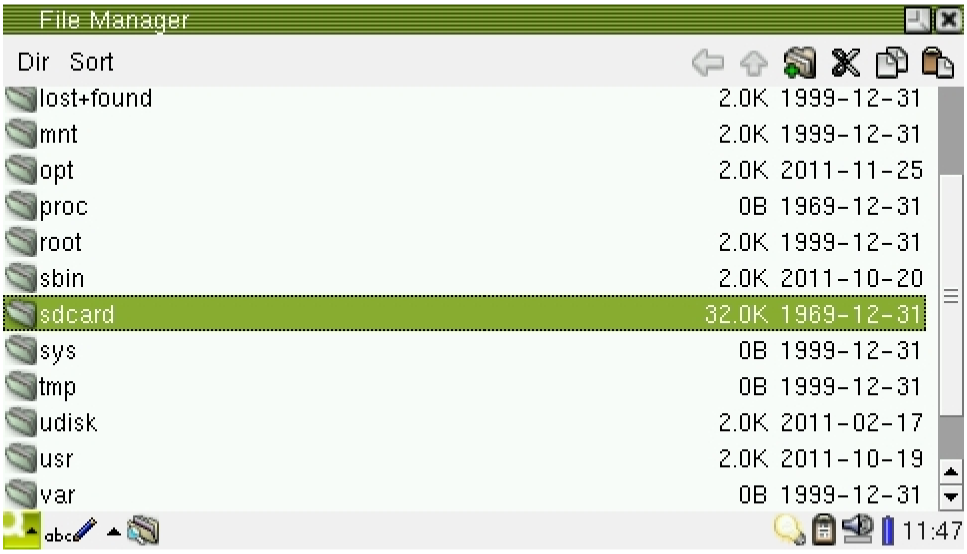


```
[root@FORLINX6410]# ls /sdcard
5555                 com31                nand
88KEY.EXE            loopback             u-boot.bin
MP3                  mcp251x.ko           zImage
```

The methods above are used to test SD card through command line. Of course, if you do not like to use command line to test, you could select graphical interface.

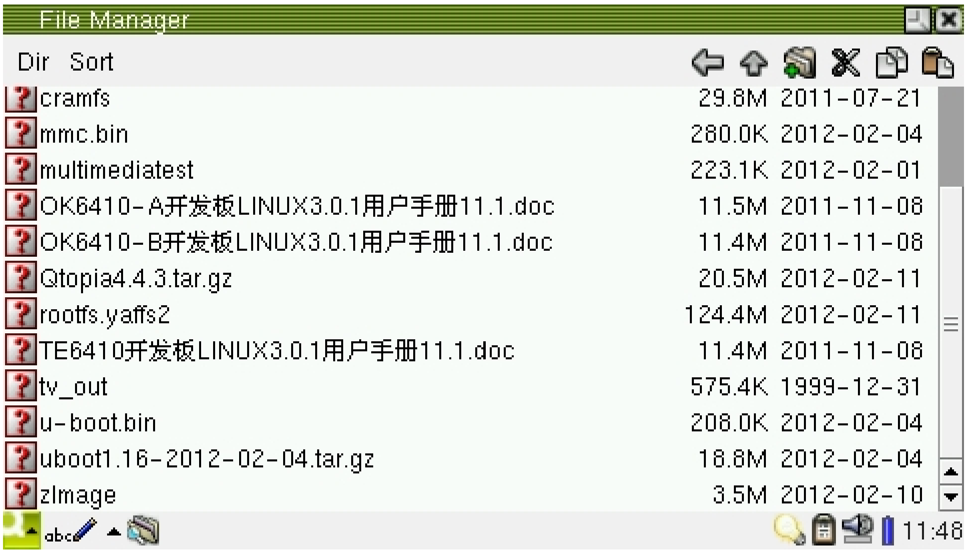


You could use the file browser to browse files in the NandFlash, SD card, U disk. When a SD card is put into the development board, open SD card directory . When using the U disk, open U disk directory.



lost+found	2.0K	1999-12-31
mnt	2.0K	1999-12-31
opt	2.0K	2011-11-25
proc	0B	1969-12-31
root	2.0K	1999-12-31
sbin	2.0K	2011-10-20
sdcard	32.0K	1969-12-31
sys	0B	1999-12-31
tmp	0B	1999-12-31
udisk	2.0K	2011-02-17
usr	2.0K	2011-10-19
var	0B	1999-12-31

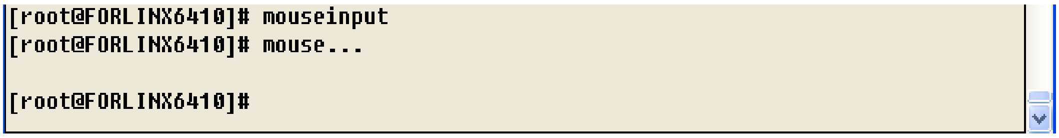
Double click SD card directory and then you could find contents of it.



```
cramfs                                   29.8M  2011-07-21
mmc.bin                                 280.0K  2012-02-04
multimediatest                          223.1K  2012-02-01
OK6410-A开发板LINUX3.0.1用户手册11.1.doc    11.5M  2011-11-08
OK6410-B开发板LINUX3.0.1用户手册11.1.doc    11.4M  2011-11-08
Qtopia4.4.3.tar.gz                       20.5M  2012-02-11
rootfs.yaffs2                           124.4M  2012-02-11
TE6410开发板LINUX3.0.1用户手册11.1.doc      11.4M  2011-11-08
tv_out                                  575.4K  1999-12-31
u-boot.bin                              208.0K  2012-02-04
uboot1.16-2012-02-04.tar.gz              18.8M  2012-02-04
zImage                                    3.5M  2012-02-10
```

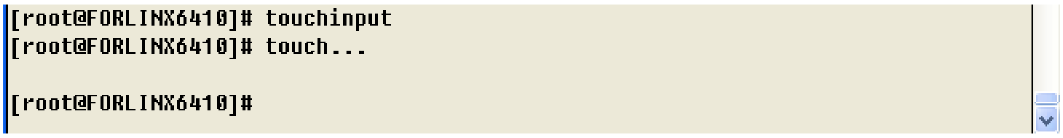
3-5 Switching between mouse input and touch input

This system can not support these two input models at the same time.
The method of switching to the USB mouse input: type #mouseinput in the terminal.



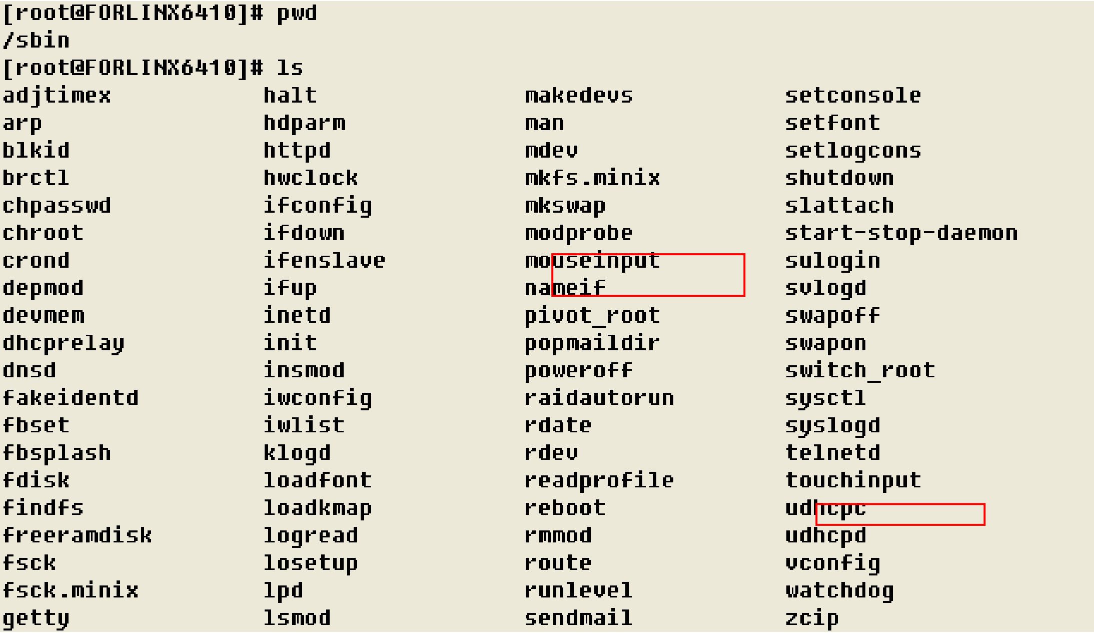
```
[root@FORLINX6410]# mouseinput
[root@FORLINX6410]# mouse...

[root@FORLINX6410]#
```

The method of switching to the touch input: type #touchinput in the terminal.



```
[root@FORLINX6410]# touchinput
[root@FORLINX6410]# touch...

[root@FORLINX6410]#
```

Touch input and mouse input commands are scripts which locate in the directory of /sbin of root file system, the path is shown in following picture:



```
[root@FORLINX6410]# pwd
/sbin
[root@FORLINX6410]# ls
adjtimex           halt               makedevs           setconsole
arp                hdparm             man                setfont
blkid              httpd              mdev               setlogcons
brctl              hwclock            mkfs.minix         shutdown
chpasswd           ifconfig           mkswap             slattach
chroot             ifdown             modprobe           start-stop-daemon
crond              ifenslave          mouseinput         sulogin
depmod             ifup               nameif             svlogd
devmem             inetd              pivot_root         swapoff
dhcprelay          init               popmaildir         swapon
dnsd               insmod             poweroff           switch_root
fakeidentd         iwconfig           raidautorun        sysctl
fbset              iwlist             rdate              syslogd
fbsplash           klogd              rdev               telnetd
fdisk              loadfont           readprofile        touchinput
findfs             loadkmap           reboot             udhcpc
freeramdisk        logread            rmmod              udhcpd
fsck               losetup            route              vconfig
fsck.minix         lpd                runlevel           watchdog
getty              lsmod              sendmail           zcip
```

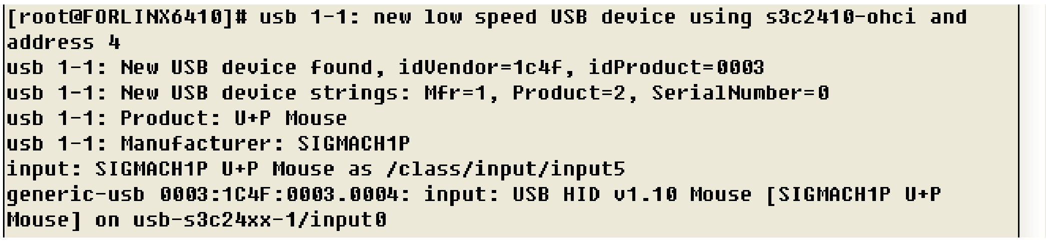
3-6 USB host interface testing

3-6-1 USB mouse

Step1. Switch to USB mouse input by methods that been referred in the 3-4.

Step2. Insert USB mouse into the USB host interface of the carrier board.
Physical connection is as follows:

Serial port terminal will display information of USB mouse after connection. Because there are various chips of mouse, the information will not same with each other.
Information are displayed as the next picture:



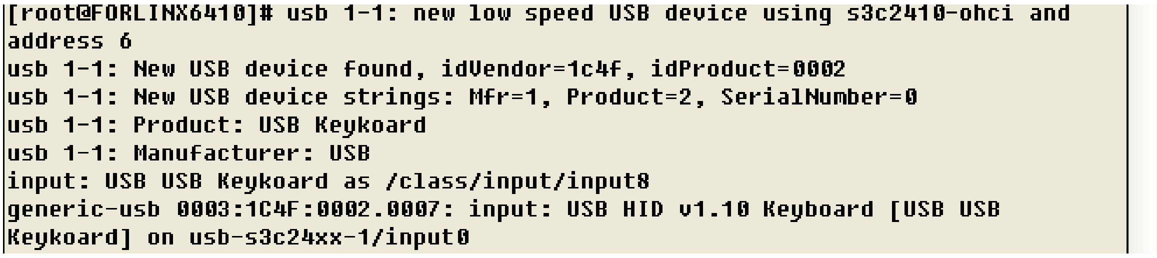
```
[root@FORLINX6410]# usb 1-1: new low speed USB device using s3c2410-ohci and
address 4
usb 1-1: New USB device found, idVendor=1c4f, idProduct=0003
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb 1-1: Product: U+P Mouse
usb 1-1: Manufacturer: SIGMACH1P
input: SIGMACH1P U+P Mouse as /class/input/input5
generic-usb 0003:1C4F:0003.0004: input: USB HID v1.10 Mouse [SIGMACH1P U+P
Mouse] on usb-s3c24xx-1/input0
```

3-6-2 USB keyboard

The Forlinx kernel could support the USB keyboard, insert USB keyboard, the serial port will appear indication information shown in the following picture.
Physical connection is as follows:

Serial port terminal will display information of USB mouse after connection. Because there are various chips of mouse, the information will not same with each other.

Information are displayed in the next picture:



```
[root@FORLINX6410]# usb 1-1: new low speed USB device using s3c2410-ohci and
address 6
usb 1-1: New USB device found, idVendor=1c4f, idProduct=0002
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb 1-1: Product: USB Keykoard
usb 1-1: Manufacturer: USB
input: USB USB Keykoard as /class/input/input8
generic-usb 0003:1C4F:0002.0007: input: USB HID v1.10 Keyboard [USB USB
Keykoard] on usb-s3c24xx-1/input0
```

3-6-3 Mount U disk

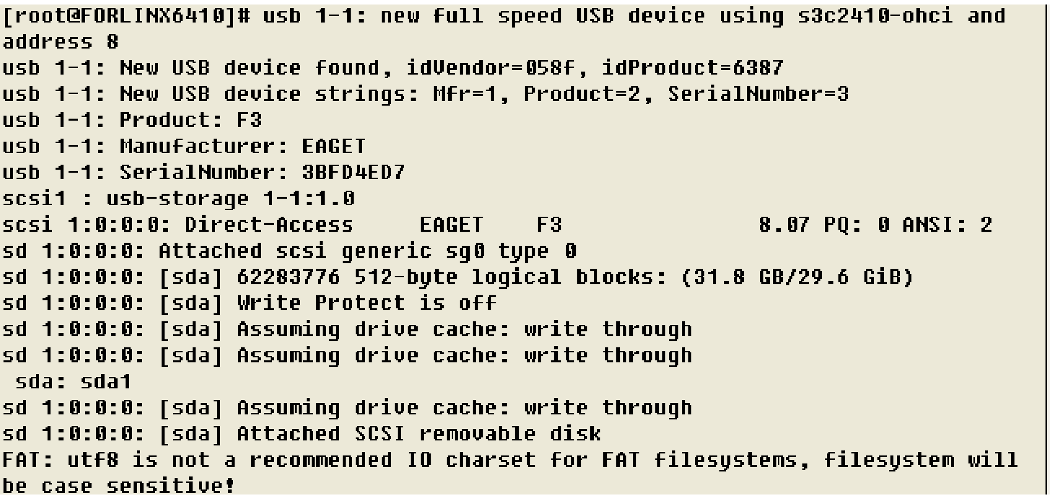
The board support hot plugging of U disk. The system will automatically mount U disk into the directory of /udisk.

At present, U disk with 32G is supported in the test and that of above 32G has not been tested.

Physical connection is as follows:

Serial port terminal will display information of USB disk. Because of the variety of U disk, the information displayed will not same with each other.

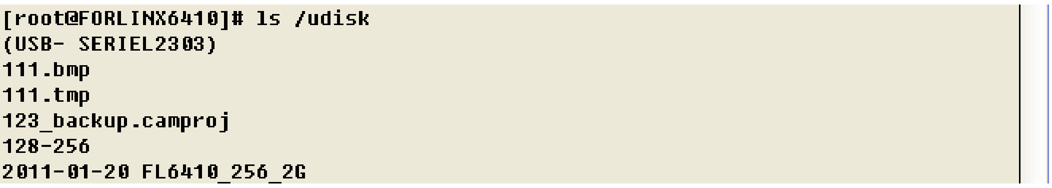
Information is displayed in the next picture:



```
[root@FORLINX6410]# usb 1-1: new full speed USB device using s3c2410-ohci and
address 8
usb 1-1: New USB device found, idVendor=058f, idProduct=6387
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
usb 1-1: Product: F3
usb 1-1: Manufacturer: EAGET
usb 1-1: SerialNumber: 3BFD4ED7
scsi1 : usb-storage 1-1:1.0
scsi 1:0:0:0: Direct-Access     EAGET    F3               8.07 PQ: 0 ANSI: 2
sd 1:0:0:0: Attached scsi generic sg0 type 0
sd 1:0:0:0: [sda] 62283776 512-byte logical blocks: (31.8 GB/29.6 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Assuming drive cache: write through
sd 1:0:0:0: [sda] Assuming drive cache: write through
 sda: sda1
sd 1:0:0:0: [sda] Assuming drive cache: write through
sd 1:0:0:0: [sda] Attached SCSI removable disk
FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will
be case sensitive!
```

Check files in the U disk,   command and consequences are shown in next picture:

#ls /udisk



```
[root@FORLINX6410]# ls /udisk
(USB- SERIEL2303)
111.bmp
111.tmp
123_backup.camproj
128-256
2011-01-20 FL6410_256_2G
```

Methods above are used to test mounting of u disk through command line, you also could test U disk by using graphical interface.Insert U disk into the USB port, use file browser in the Qtopia2.2.0 desktop environment to check files in the U disk.

3-7 Ethernet drive test and relevant services

3-7-1 Relevant configuration of network

In the tests of this chapter, the environment of network is as follows:

Network connection mode: connect board directly with router that could connect with internet.

IP: 192.168.0.232

Router IP：192.168.0.201

Subnet mask: 255.255.255.0

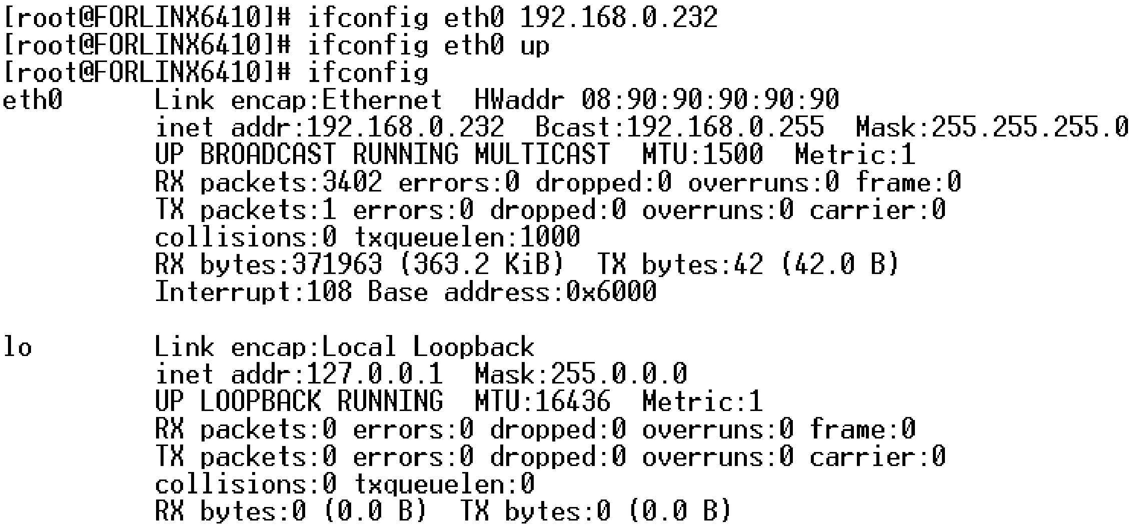
The network using environment of each board is different; we use the above network environment to demonstrate for you. Please configurate it according to the real network environment.

Set up IP address through command line

#ifconfig eth0 192.168.0.232 （setup IP:192.168.0.232）

#ifconfig eth0 up （将 eth0[dm9000]使能）

#ifconfig （check the present network condition）

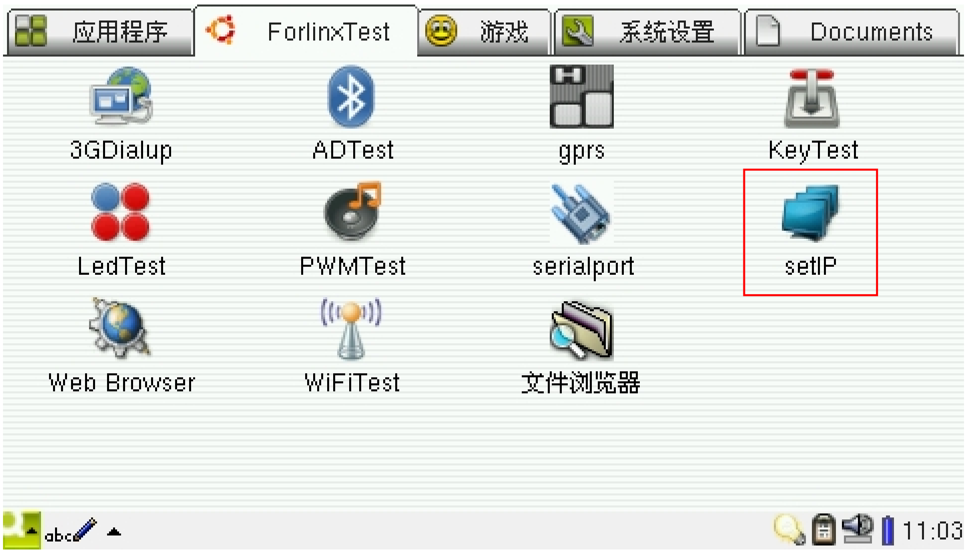


```
[root@FORLINX6410]# ifconfig eth0 192.168.0.232
[root@FORLINX6410]# ifconfig eth0 up
[root@FORLINX6410]# ifconfig
eth0      Link encap:Ethernet  HWaddr 08:90:90:90:90:90
          inet addr:192.168.0.232  Bcast:192.168.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:3402 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:371963 (363.2 KiB)  TX bytes:42 (42.0 B)
          Interrupt:108 Base address:0x6000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

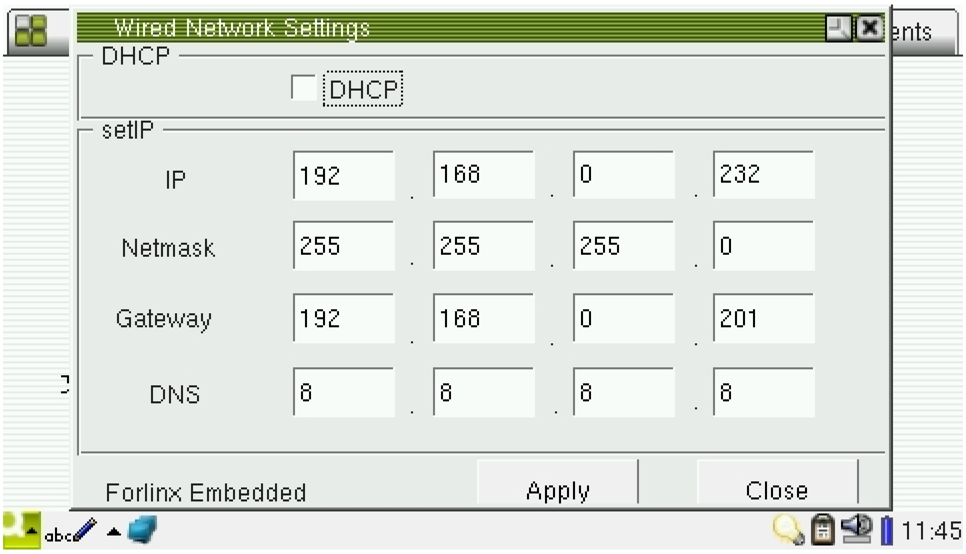
If the board is connected with router that could support DHCP to automatically allocate IP address, you could type in udhcpc –i eth0 command in the DNW or hyper terminal to dynamically obtain IP address. –i parameters are used to designate the name of network card, Cable network card name of the Forlinx board is etho.

●Set up IP address through graphical interface

In the Qtopia2.2.0desktop environment, there is an IP address set-up software in the Forlinx program group. This software not only could set up fixed IP address but also could obtain IP address dynamically from router. It is a great assistant in the network application.



Double-click set IP icon:



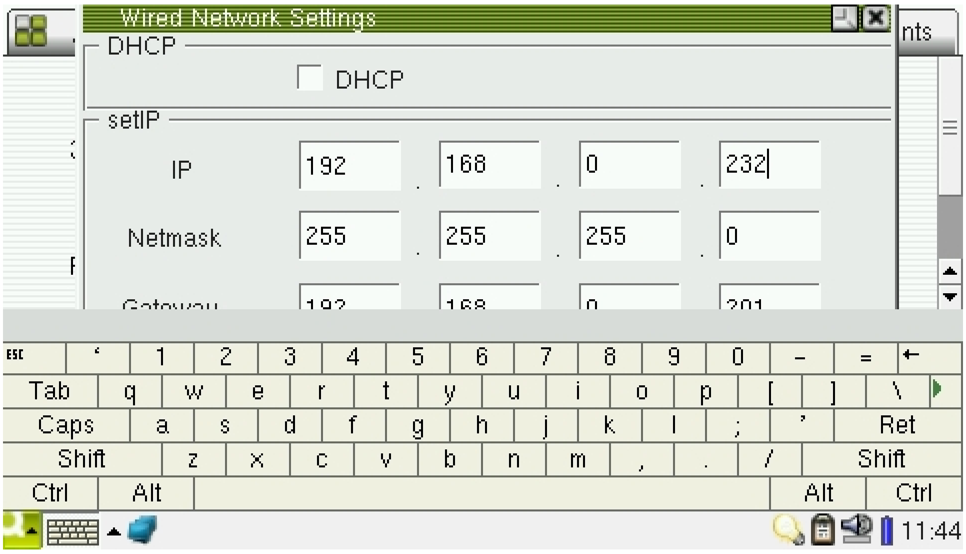
DHCP

□ DHCP

setIP

IP	192	168	0	232
Netmask	255	255	255	0
Gateway	192	168	0	201
DNS	8	8	8	8

You could use soft keyboard or USB keyboard to input IP address.



Wired Network Settings

DHCP

☐ DHCP

setIP

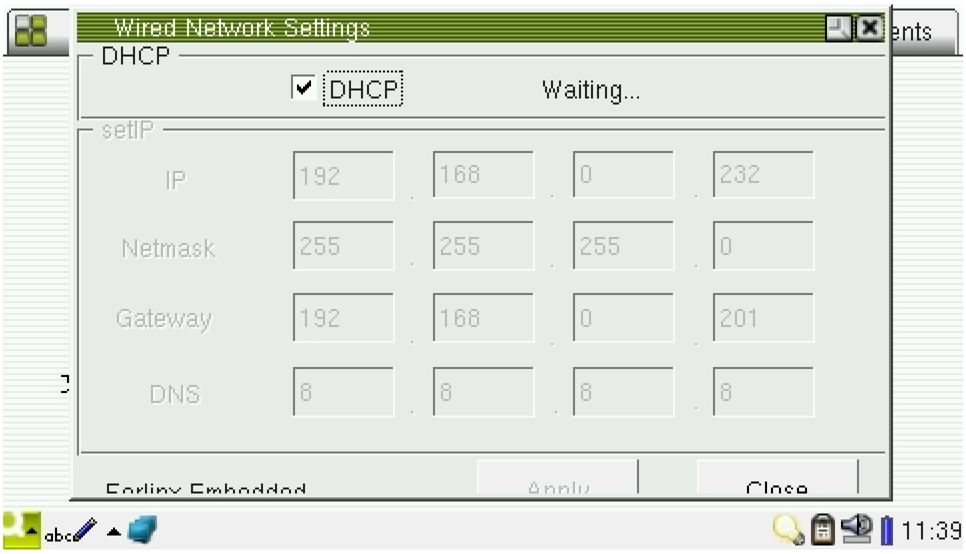
IP 192 . 168 . 0 . 232

Netmask 255 . 255 . 255 . 0

Gateway 192 . 168 . 0 . 201

nts
ESC ` 1 2 3 4 5 6 7 8 9 0 - = ←
Tab q w e r t y u i o p [ ] \
Caps a s d f g h j k l ; ' Ret
Shift z x c v b n m , . / Shift
Ctrl Alt Alt Ctrl
11:44

You could use dynamic IP to obtain functions, and the router could support DHCP is needed. Click DHCP key to start IP address allocation by the router.



Wired Network Settings

DHCP

☑ DHCP Waiting...

setIP

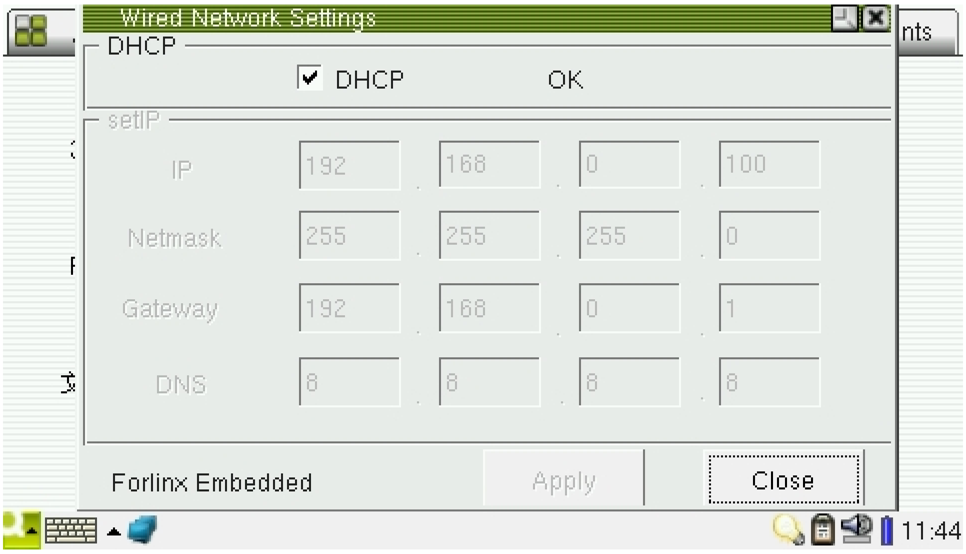
IP 192 . 168 . 0 . 232

Netmask 255 . 255 . 255 . 0

Gateway 192 . 168 . 0 . 201

DNS 8 . 8 . 8 . 8

After successfully allocate the IP address, “ok” and allocated network parameters such as IP address subnet mask, gateway, DNS and so on are displayed.



Wired Network Settings

DHCP

☑ DHCP　OK

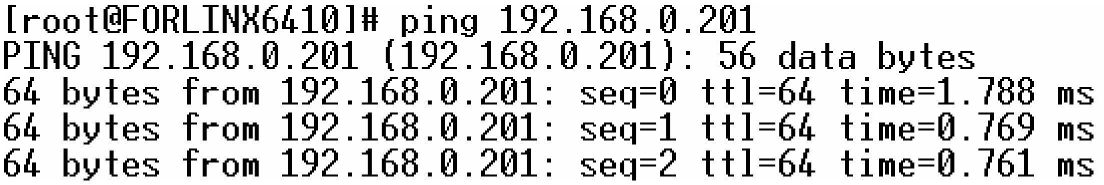
setIP

IP	192	168	0	100
Netmask	255	255	255	0
Gateway	192	168	0	1
DNS	8	8	8	8

Forlinx Embedded　Apply　Close

3-7-2 Test network using Ping order

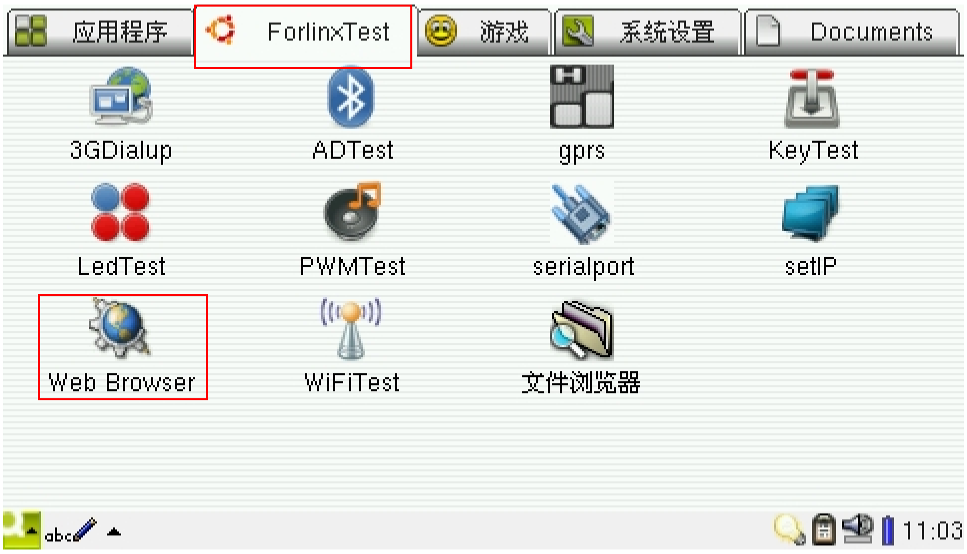
●Using Ping command #ping 192.168.0.201 –s 10000 to test wether the network is connected, 10000 represents the size of the data package;pressing Ctrl + c or Crtl + z to quit.



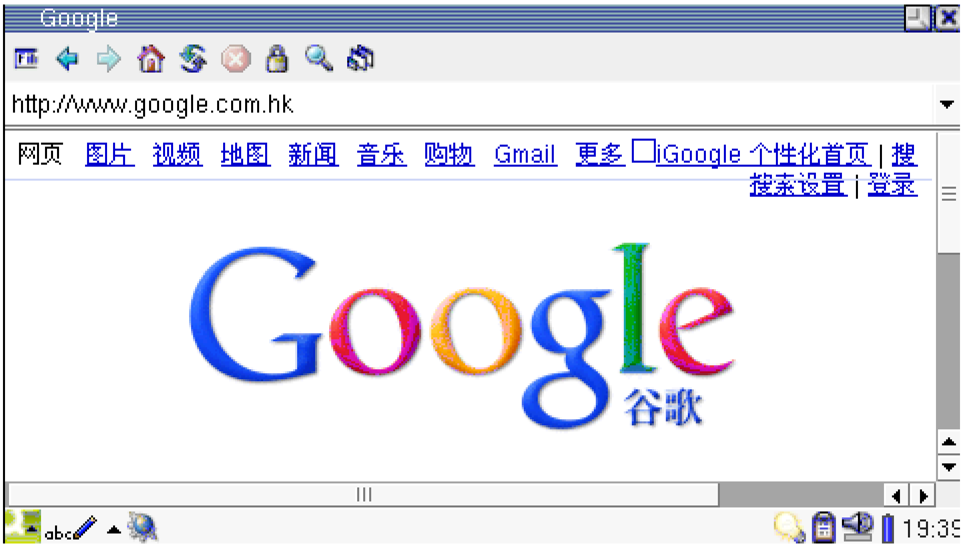
```
[root@FORLINX6410]# ping 192.168.0.201
PING 192.168.0.201 (192.168.0.201): 56 data bytes
64 bytes from 192.168.0.201: seq=0 ttl=64 time=1.788 ms
64 bytes from 192.168.0.201: seq=1 ttl=64 time=0.769 ms
64 bytes from 192.168.0.201: seq=2 ttl=64 time=0.761 ms
```

3-7-3 Browsing web page

After the network environment has been set up, click “Web Browser”icon in the “ForlinxTest”to browse web pages.



Open up the google homepage

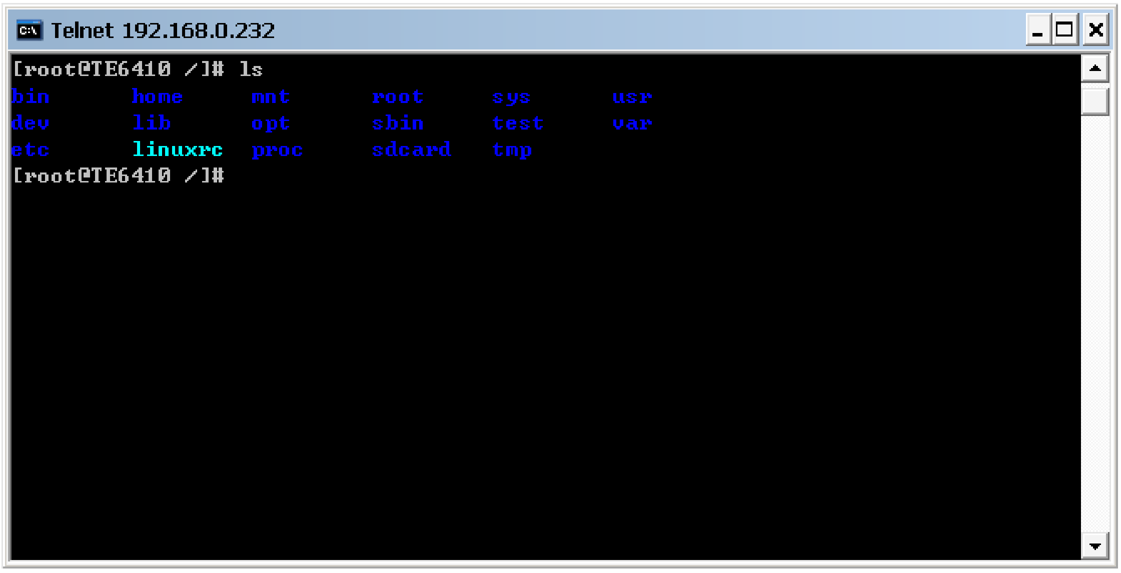

Google
http://www.google.com.hk
网页 图片 视频 地图 新闻 音乐 购物 Gmail 更多 iGoogle 个性化首页 | 搜
搜索设置 | 登录
Google 谷歌
abc
19:39

Path of browser source code in the CD:
CD\Linux-3.0.1\apptest\QT ApplicationTest\konqueror

3-7-4 Telnet service

OK6410 board has started the telnet service in the script of /etc/init.d/rcS, could work as a telnet server after setting of the IP address.

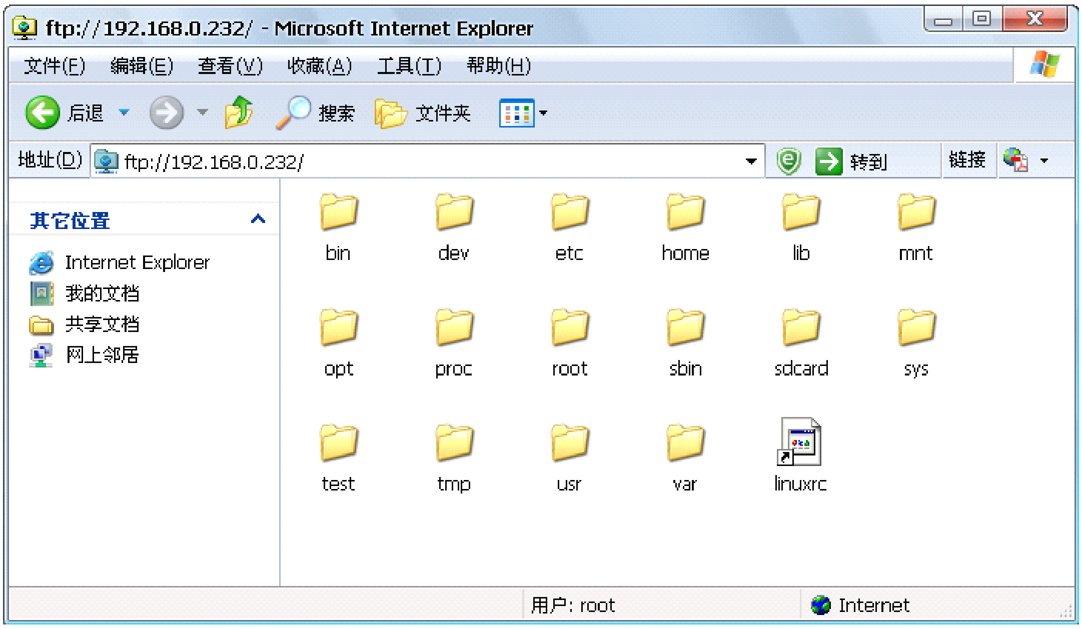
For example, the board IP address is 192.168.0.232， type telnet192.168.0.232, in the Windows command window, type in root in the username blank,keep the pass word empty.(start-> run, type in cmd and press the enter button, then the Windows command window will display before your eyes.)



```
[root@TE6410 /]# ls
bin       home      mnt       root      sys       usr
dev       lib       opt       sbin      test      var
etc       linuxrc   proc      sdcard    tmp
[root@TE6410 /]#
```

3-7-5 FTP service

The ftp service has automatically started when the system is started. You could use ftp software to visit, type in root in the username blank, keep the password empty; the next picture will show you the screen shot using IE to visit ftp.


ftp://192.168.0.232/ - Microsoft Internet Explorer
文件(F) 编辑(E) 查看(V) 收藏(A) 工具(T) 帮助(H)
后退
搜索
文件夹
地址(D)
转到
链接
其它位置
Internet Explorer
我的文档
共享文档
网上邻居
Internet

地址(D) ftp://192.168.0.232/

bin dev etc home lib mnt
opt proc root sbin sdcard sys
test tmp usr var linuxrc

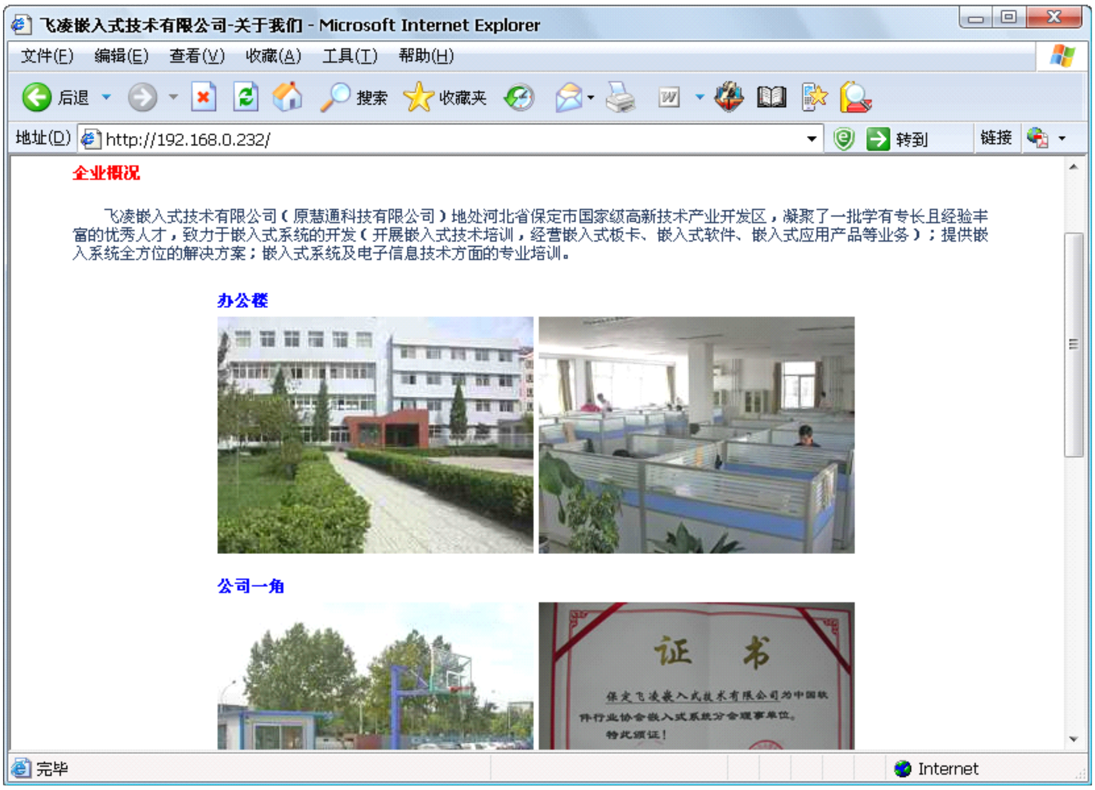
用户: root

FTP function could help you realize the file transmission between the development board and the PC.

3-7-6 Web service

We have transplant a web server：boa onto the boards; boa web server is a exquisite and high-efficient web server which could run on the Unix and Linux platform, support CGI,and is totally open- source; this single-tasking http server is very suitable for the embedded system.

ftp service is automatically started when the system is started. Type in the board IP address in the IE address bar,then you could start to browse the web pages of the web server. The following screen shot is taken during browsing through IE.


飞凌嵌入式技术有限公司-关于我们 - Microsoft Internet Explorer
文件(F) 编辑(E) 查看(V) 收藏(A) 工具(T) 帮助(H)
后退 搜索 收藏夹
地址(D) http://192.168.0.232/
转到 链接
证 书
完毕
Internet

企业概况

飞凌嵌入式技术有限公司（原慧通科技有限公司）地处河北省保定市国家级高新技术产业开发区，凝聚了一批学有专长且经验丰富的优秀人才，致力于嵌入式系统的开发（开展嵌入式技术培训，经营嵌入式板卡、嵌入式软件、嵌入式应用产品等业务）；提供嵌入系统全方位的解决方案；嵌入式系统及电子信息技术方面的专业培训。

办公楼

公司一角

3-7-7 Using NFS to mount network file system

Preparation of NFS file system directory

1.Prepare for NFS file system directory

Before starting nfs service, NFS sharing directory must be well prepared in the Ubuntu

For example, we use “/forlinx/root”of Ubuntu as NFS sharing directory, copy the compressed FileSystem-Yaffs2.tar.gz to this directory, decompress and obtain the directory which is needed by root file system.

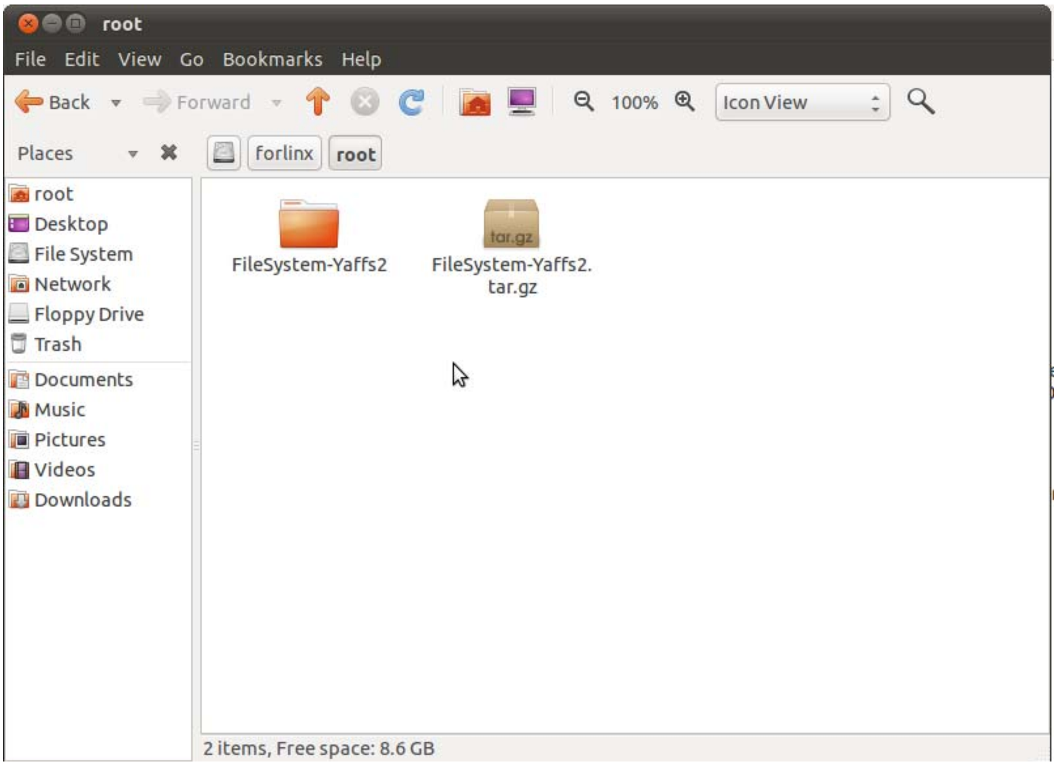
Open up a terminal in the Ubuntu, type in following commands:

```
#mkdir /forlinx/root
```

Copy and paste FileSystem-Yaffs2.tar.gz into this directory, decompress it :

#tar –zxf FileSystem-Yaffs2.tar.gz

After completing decompression, the result is shown in the next picture:



2. Set up IP of host machine

We set up IP of Ubuntu as 192.168.0.231

3. Configuration of NFS service

Build a terminal in Ubuntu,type in the following commands successively:

```
#sudo apt-get install portmap
#sudo apt-get install nfs-kernel-server
#sudo gedit /etc/exports
```

Edit exports files in the pop-up text editor; add the command:

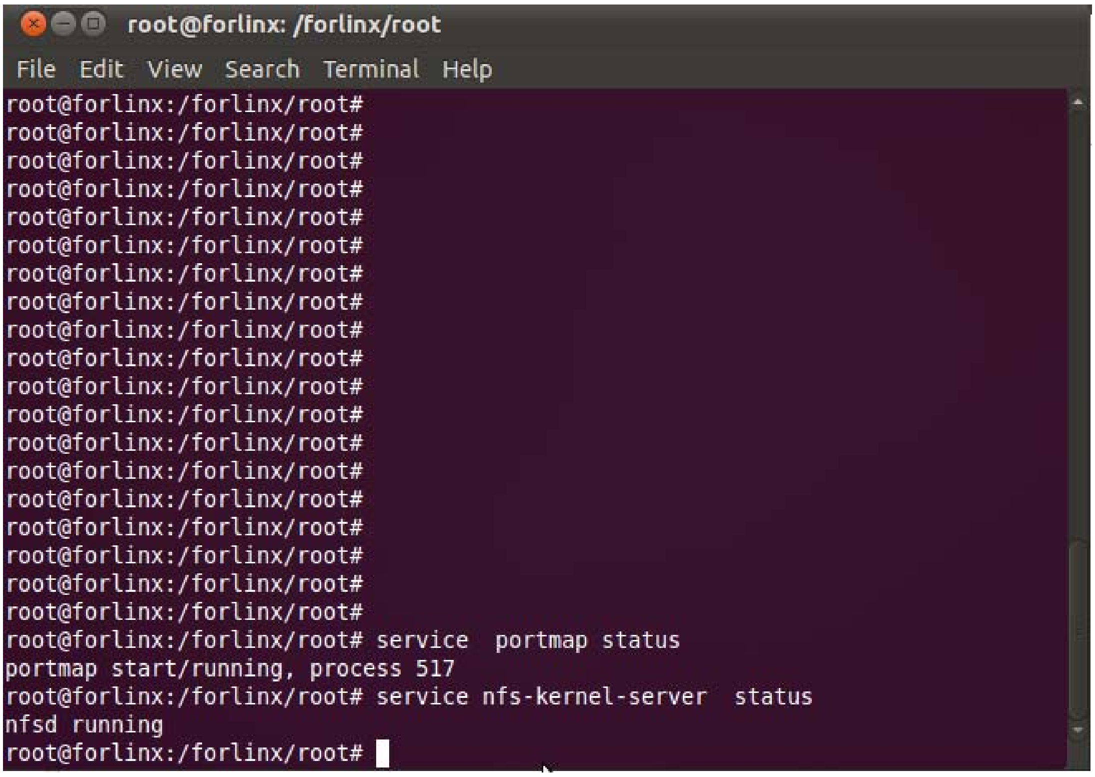
/forlinx *(rw,sync,no_root_squash)in the last line:

4. Start NFS service

```
#sudo /etc/init.d/portmap restart
#sudo /etc/init.d/nfs-kernel-server restart
```

5. Check whether the service is running

```
#service portmap status
#service nfs-kernel-server status
```


root@forlinx: /forlinx/root
File Edit View Search Terminal Help

```
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
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root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root#
root@forlinx:/forlinx/root# service  portmap status
portmap start/running, process 517
root@forlinx:/forlinx/root# service nfs-kernel-server  status
nfsd running
root@forlinx:/forlinx/root#
```

We could find the portmap and nfs-kernel-server is running in this picture.

Mount root file system to the host machine

Typing in the following commands in the U-boot command line to set up U-boot starting parameters.

```
#setenv
bootargs"root=/dev/nfsnfsroot=192.168.0.231:/forlinx/root/FileSystem-Yaffs2
ip=192.168.0.232:192.168.0.231:192.168.0.201:255.255.255.0:witech.com.
cn:eth0:off console=ttySAC0,115200"
```

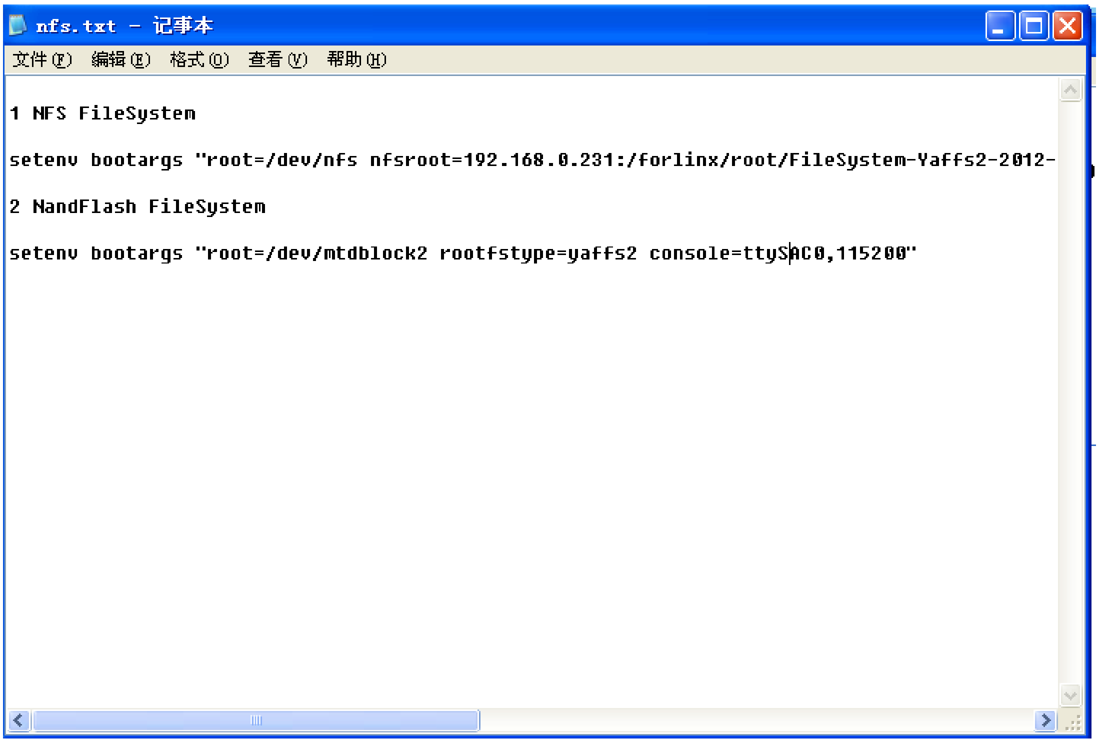
save：

```
#saveenv
```

Note: Press the Space button(NOT THE ENTER BUTTON) between setenv and bootargs.

In addition, nfs.txt , which contains setting methods of NFS root file system,could be found in the CD .You do not need to type by yourself , just copy the setting under the NFS FileSystem in the nfs.txt, and paste into the Uboot.local FileSystem of NandFlash also be included, so that you could converse between network file system and local file system. Do not forget to conduct saveenv to protect parameter setup command.

The picture is as follows:



```
1 NFS FileSystem

setenv bootargs "root=/dev/nfs nfsroot=192.168.0.231:/forlinx/root/FileSystem-Yaffs2-2012-

2 NandFlash FileSystem

setenv bootargs "root=/dev/mtdblock2 rootfstype=yaffs2 console=ttySAC0,115200"
```

Restart the board, NFS file system will be automatically mounted by kernel after starting. We will explain IP in the bootargs parameters here, take the above configuration as a example,Please make correction according to real network environment during practical operation process.

192.168.0.231	IP of Ubuntu
192.168.0.232	IP of board, board IP and IP of PC terminal are in same network segment, here we use0 network segment
192.168.0.201	gateway
255.255.255.0	subnet mask

All parts such as the board network setting, PC Linux network configuration, hardware network line connection and board mount are relevant to the completement of nfs mounting. If the mounting fails, you need to check from above sections.If the virtual machine is used to install Linux, windows anti-virus software and fire wall should be shut down when mounting nfs.

Mount directory files to the host machine.

Step1. According to practical situation,set up nfs server of PC Linux.

Here we suppose the contents of /etc/exports as“/   *”

/   stands for PC Linux root directory and subdirectory could be mounted

* stands for the authority is at greatest phase when mounting.

Step2. Set up network environment of the board such as IP, make sure the board IP and PC Linux are in the same network segment.

Step3. Shut down all anti-virus software and fire wall. If it is not been done, the mounting could not be completed.

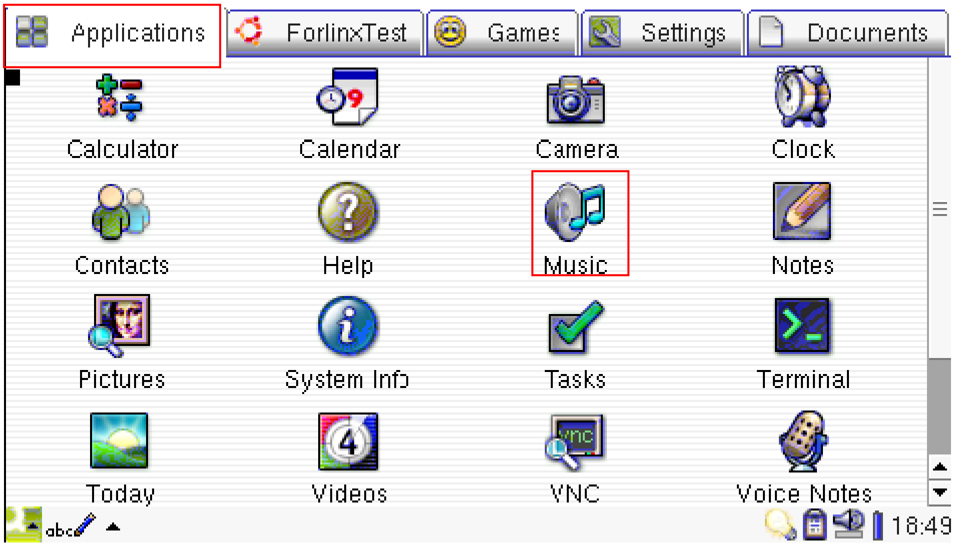
Step4. Mount nfs to /temp in the board.

```
#mount –t nfs   -o nolock   192.168.0.1:/mnt   /temp
```

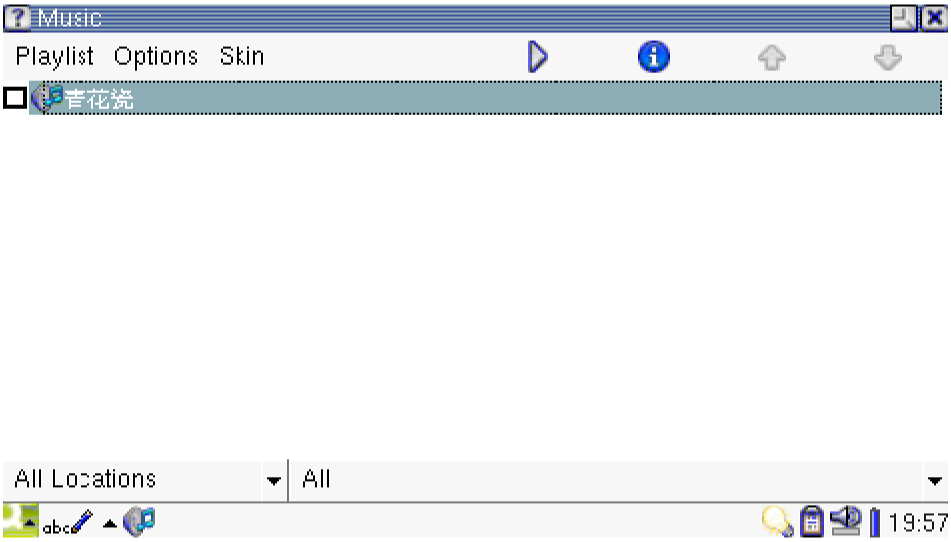
After execution of above commands, /temp directory in the board and /mnt directory in the Linux host may have established sharing relation.When conducting ls –al /temp in the hyper terminal or DNW, you could see all files under the /mnt file system directory in the host. In addition, you could compile application program in PC Linux and locate it under the /mnt directory in PC ,execute cd / temp command in hyper terminal or DNW software and enter into the temp directory to execute application program, all these will speed up your R & D debugging progress.

3-8 Audio test

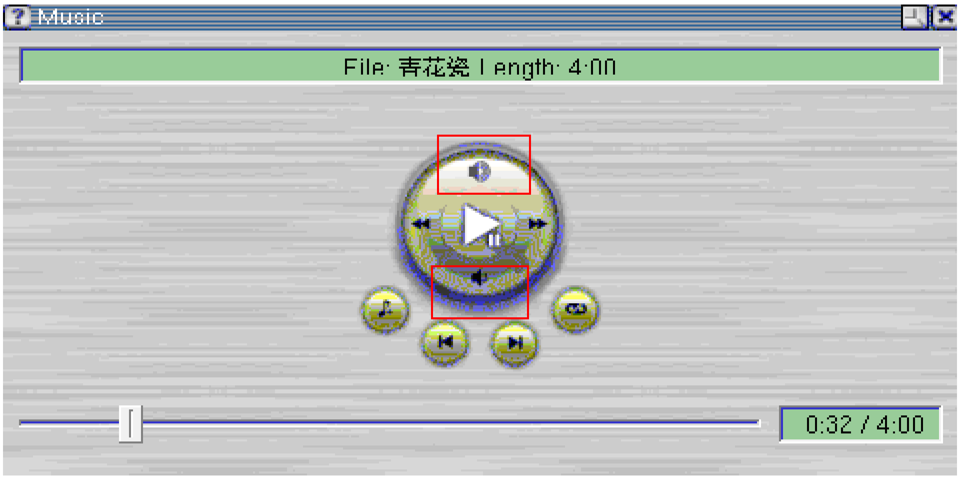
Click application tab on the desktop under qtopia system, you will find"Music" icon,"Music" is the application program of audio player.



Click"Music" player, the player will automatically search for audio files under the directory of /root/QtopiaHome/Documents/ in the board. Finally you will find a audio file named" 青花瓷"



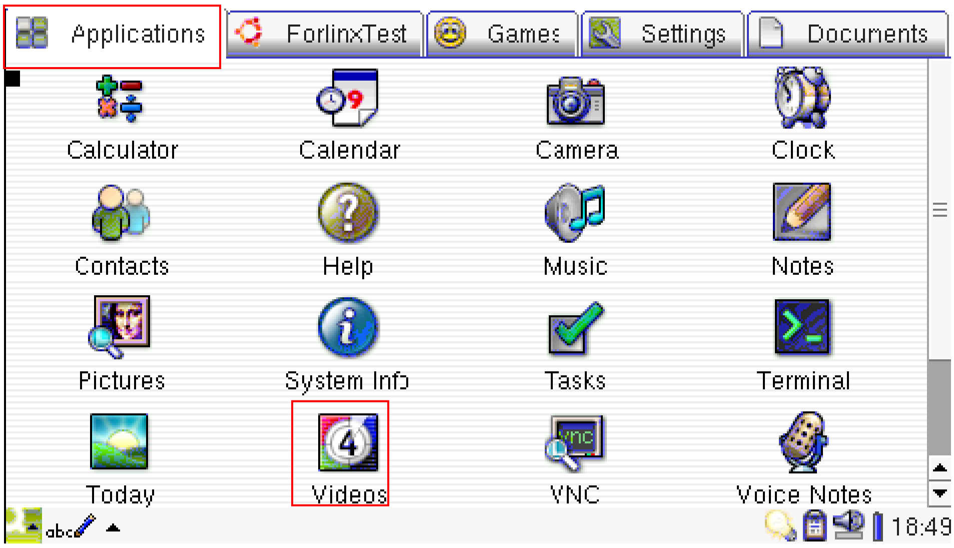
Click this file name to broadcast.



If you need to quit, click ☒ on the top right corner, buttons in the red wire frame are responsible for adjusting volume.

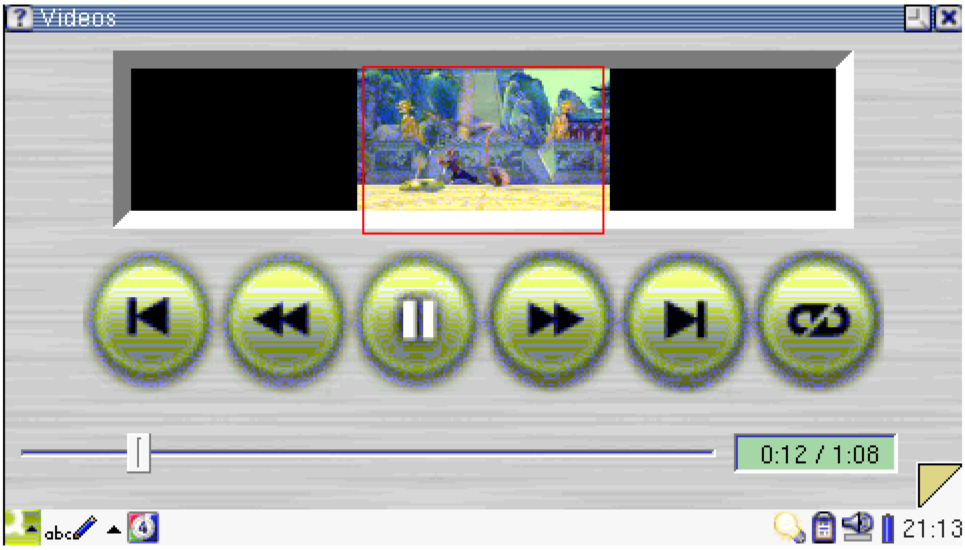
3-9 video test

Click application tab on the desktop under qtopia system, you could find ”video” icon, ” video” is the application program of video player.



Click” Videos” player, the player will automatically search for video files under the directory of /root/QtopiaHome/Documents/ in the board. Finally you will find a audio file named” panda”.

Click this file name to broadcast this video file. Click the center part to maximize this video.



If you need to quit, click ☒ on the top right corner.

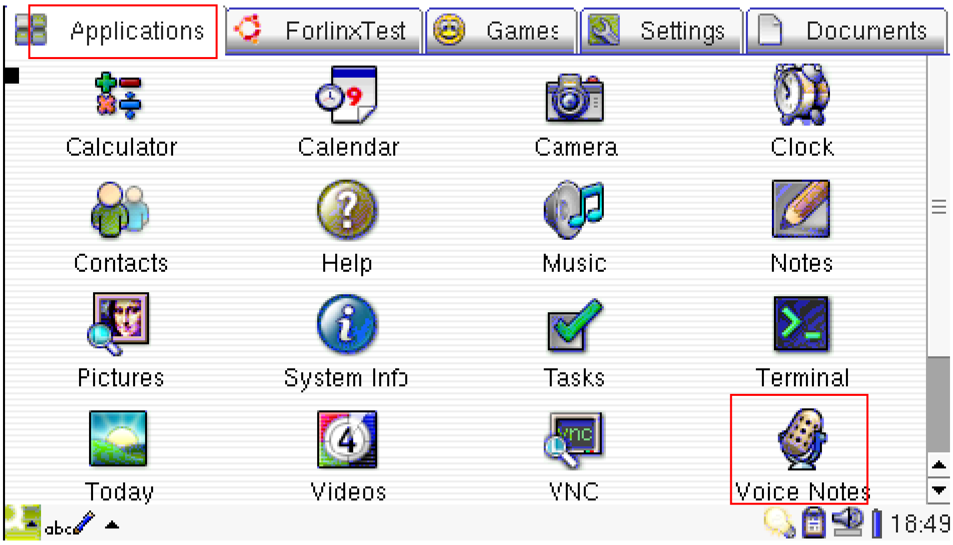
3-10 record test

There are two methods for record test: audio note test and ben test.

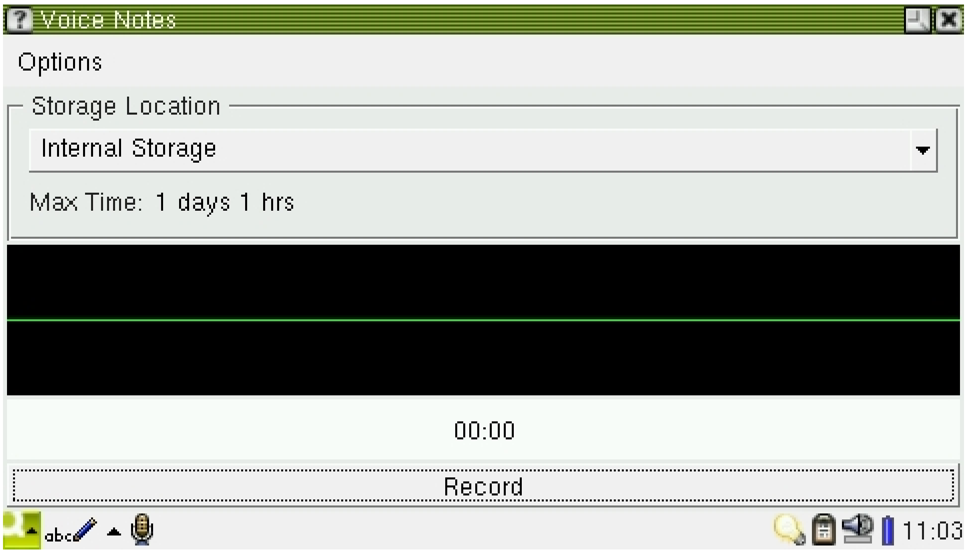
3-10-1 Audio note

Click application option in the qtopia desktop, an icon of “Voice Notes” will be found.

It is used for recording voices.



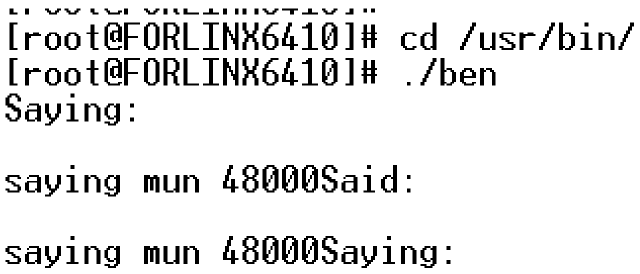
Click new to create a new audio file.



Click Record to record voices, click stop to terminate the record, a new file will be created, click it to broadcast.

3-10-2 Ben test program

At first, plug in the earphone and microphone.
Ben executable file is under /usr/bin/, test procedures are as follows:



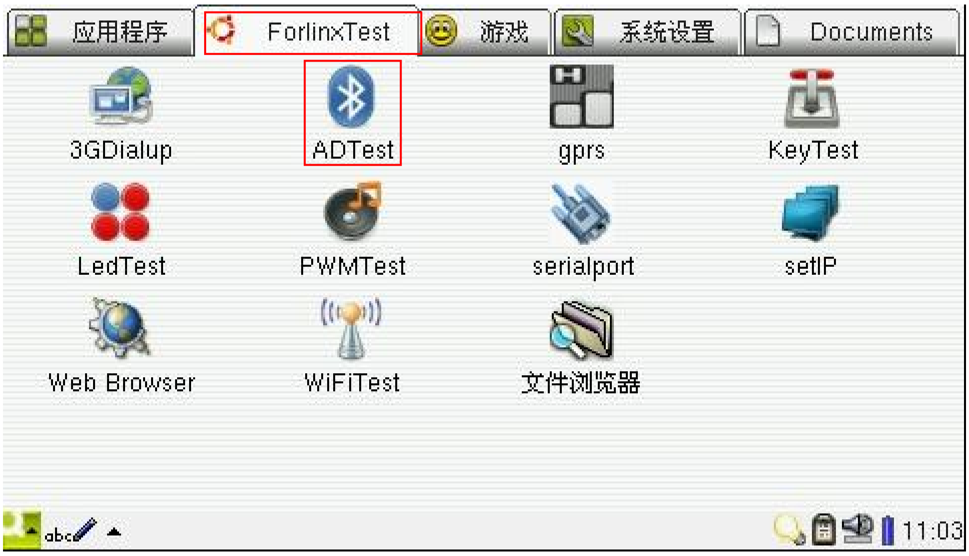
```
[root@FORLINX6410]# cd /usr/bin/
[root@FORLINX6410]# ./ben
Saying:

saying mun 48000Said:

saying mun 48000Saying:
```

When the "saying" appears, the system enter into the record status. After finished the record, press the "enter"button, “saying mun 48000Said:”appears, and the recorded voice will play.

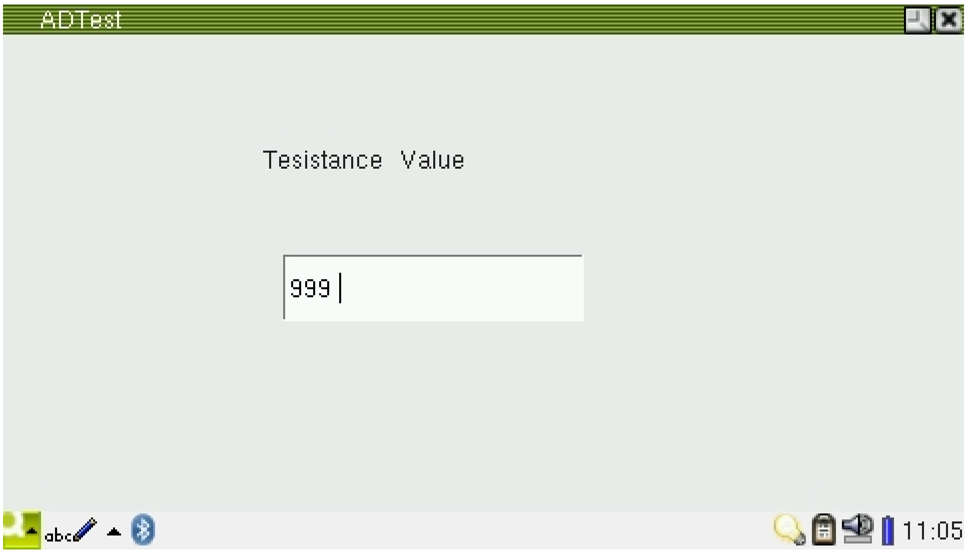
Bens source code path：
CD\ Linux-3.0.1\apptest\QT ApplicationTest\ben_test\ben.c

3-11 Sampling test

Step1. Click Forlinx Test tab on the desktop under qtopia system, you could find l” ADTest” icon,” ADTest” is the application program for sampling test.



Step2. Click” ADTest”,then the AD conversion value will be displayed.



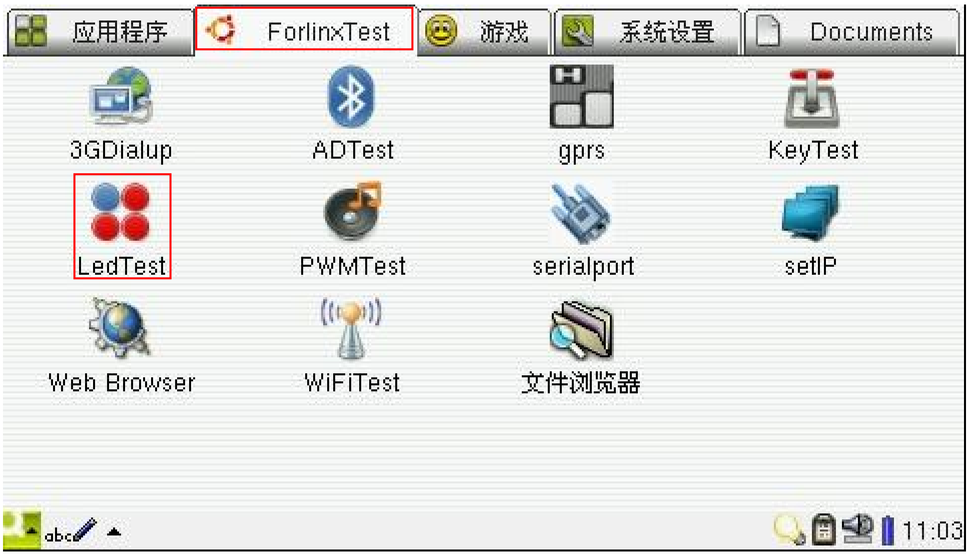
Tesistance Value

999

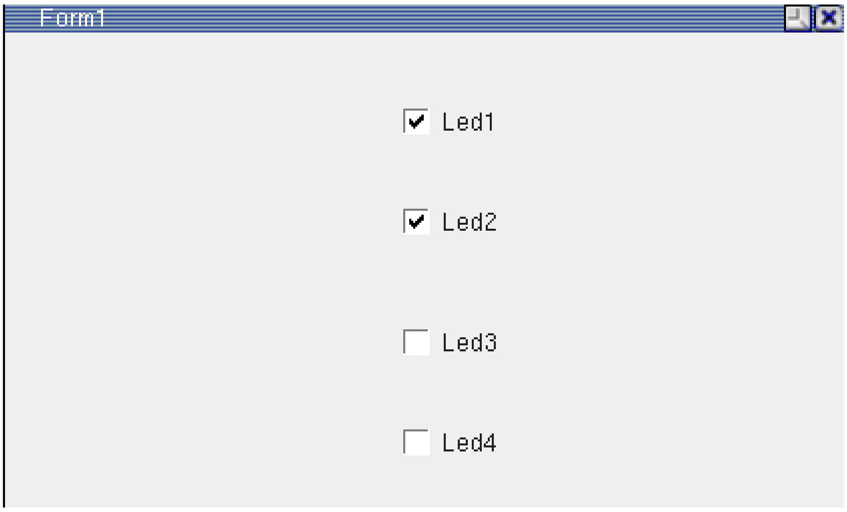
Step3. Using the stylus to click the screen, -1 will be shown in the blank.when the stylus leaves from the screen, the value recovers to the former value. If the value is -1, it tell you that the touch and sampling function could be used at the same time.

3-12 LED test

Click ForlinxTest tab on the desktop under qtopia system, you could find l" LedTest" icon," LedTest" is the application program of video player.



Click " LedTest",there will be a LED control panel, when selecting LEDs, corresponding LED will be lighted up; when canceling the LED selection, corresponding LED will become dark.



Form1

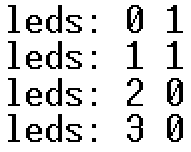
☑ Led1

☑ Led2

□ Led3

□ Led4

During each time operation, the terminal of serial port will display status of LED.

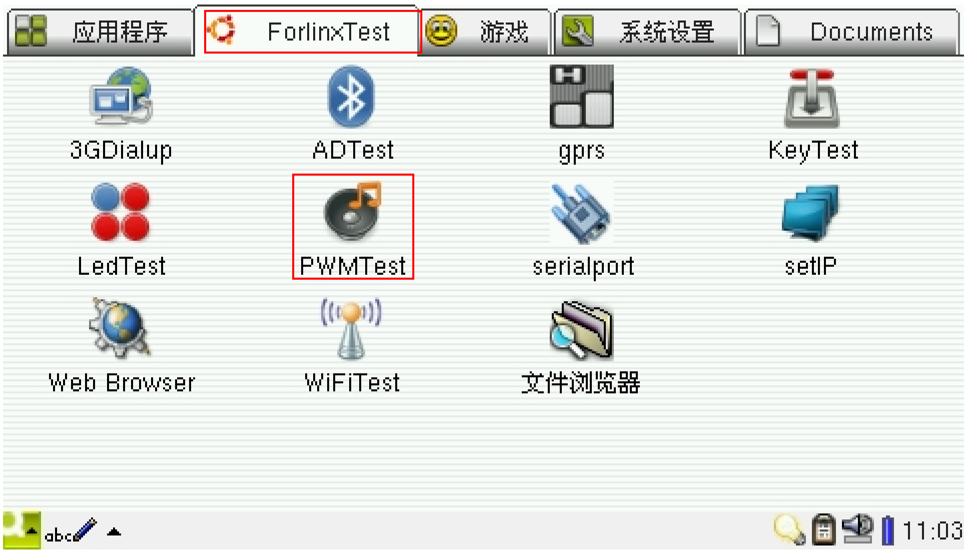


```
leds: 0 1
leds: 1 1
leds: 2 0
leds: 3 0
```

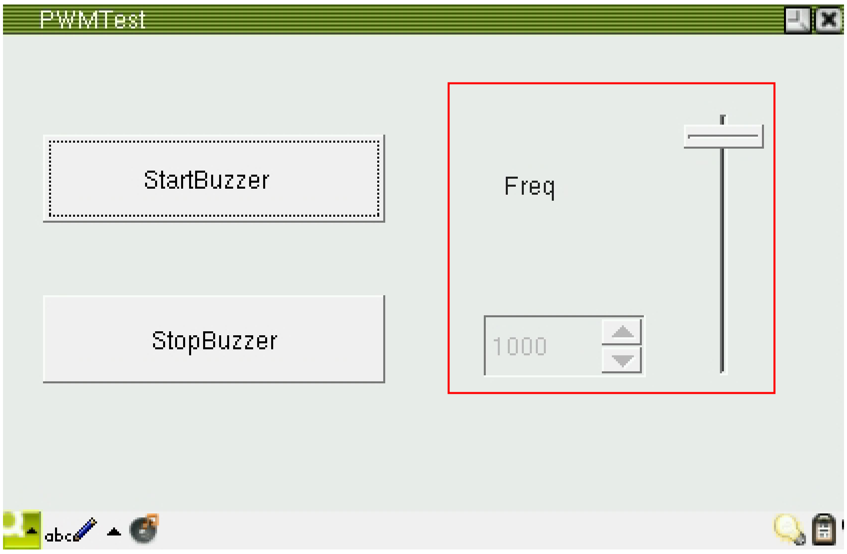
LED_Test source code path:
CD\ Linux-3.0.1\apptest\QT ApplicationTest\ledTest

3-13 Buzzer test

Click ForlinxTest tab on the desktop under qtopia system, you could find” PWMTest” icon,” PWMTest” is the test program of board.



Click” PWMTest”, there will be a PWM control panel. Click”StartBuzzer”, the buzzer begin to buzz; click”StopBuzzer”, the buzzer stop to buzz. You could use the button in the red wire frame to control the frequency,it contains coarse tuning and fine tuning.



PWMTest source code path：
CD\ Linux-3.0.1\apptest\QT ApplicationTest\PWMTest

3-14 TV output

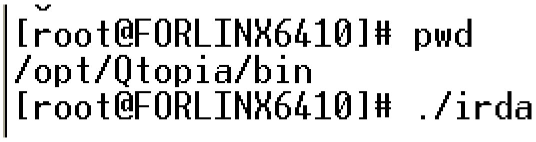
Connection method: Using TV-Out output cable to connect TV interface on the development board and TV video-in interface.

Start the board and enter into Linux3.0 system, execute command #tv-out in the command line, and then graphical interface will been found in TV set.

Restart to board to enter into LCD output.
Tv_out source code directory: CD\Linux-3.0.1.1\apptest\tv_out

3-15 Irda Test

Irda test program is located under /usr/bin/,the test procedures are as follows:



```
[root@FORLINX6410]# pwd
/opt/Qtopia/bin
[root@FORLINX6410]# ./irda
```

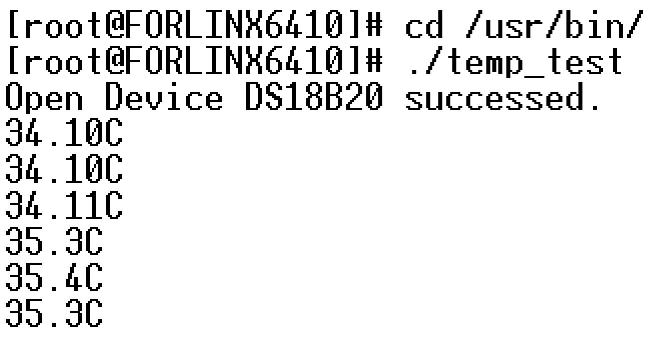
After that, the hyper-terminal will continuously print "1", when there is infrared induction, the hyper-terminal will print"0".

This program is used to test hardware level. And no software protocol at present.

Irda source code directory:CD\Linux-3.0.1\apptest\irda_test\irda_test.c

3-16 Temperature sensor test

Temperature sensor test program temp_test locates under /usr/bin/.



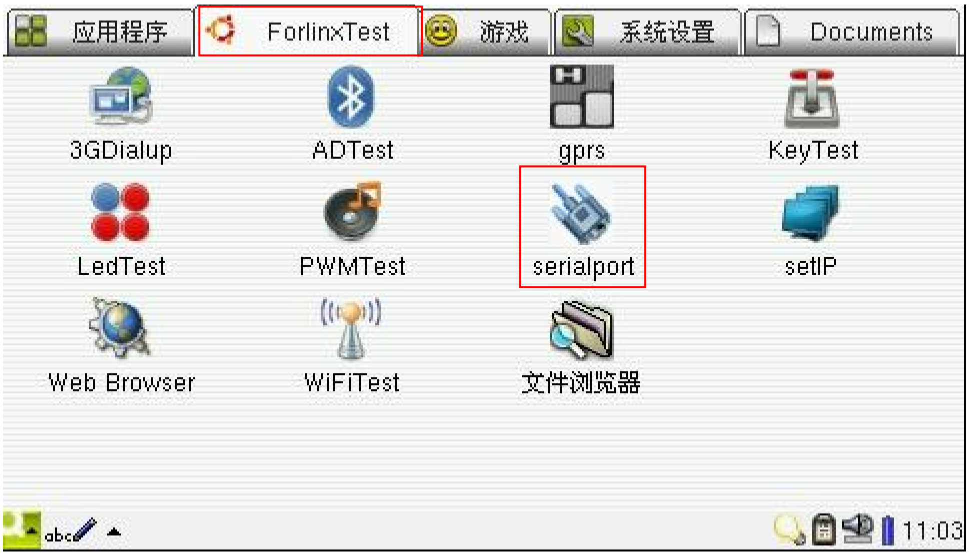
```
[root@FORLINX6410]# cd /usr/bin/
[root@FORLINX6410]# ./temp_test
Open Device DS18B20 successed.
34.10C
34.10C
34.11C
35.3C
35.4C
35.3C
```

Note: At present, temperature value will be a little higher comparing with the correct value.
Temperature sensor source code directory:CD\Linux-3.0.1\apptest\temp_est\temp_test.c

3-17 Serial port test

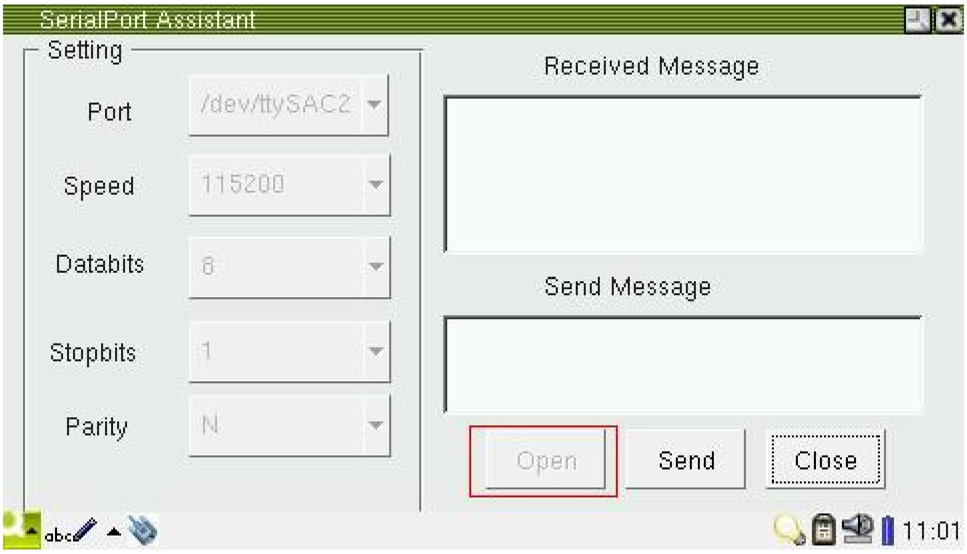
You could setup the baud rate,data bit,stop bit and odd-even check through serial port test program.

Step1. Connect the board. Connect the COM2and the PC serial port through the serial cable, open up the hyper terminal of the PC, setup its properties.
Step2. Open the software, click "ForlinxTest" in the qtopia desktop, you will find a "serialport"icon, "serialport" is the test program of serial port.



Step3. Open the serial port label. Setup the property of the serial port, and then click the Open button,the serial port will be opened. Here i connect with the COM2, so i

choose/dev/ttySAC2. the properties of the serial port should be same as that of hyper terminal in PC.



SerialPort Assistant

Setting

Port /dev/ttySAC2

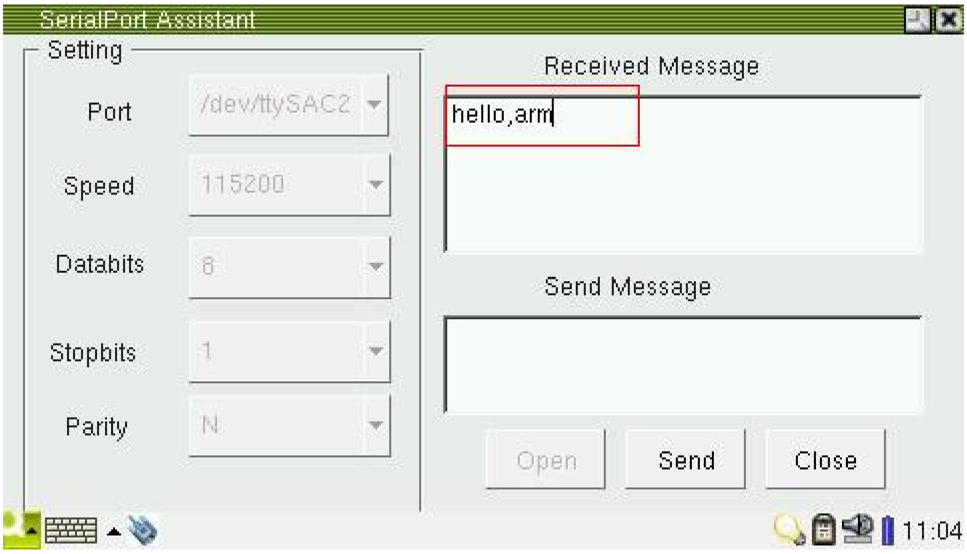
Speed 115200

Databits 8

Stopbits 1

Parity N

Step4. PC sends data to the board. Write down "hello,arm"in the PC's hyper terminal, and then it will be shown in the received message blank of the board.



SerialPort Assistant

Setting

Port /dev/ttySAC2

Speed 115200

Databits 8

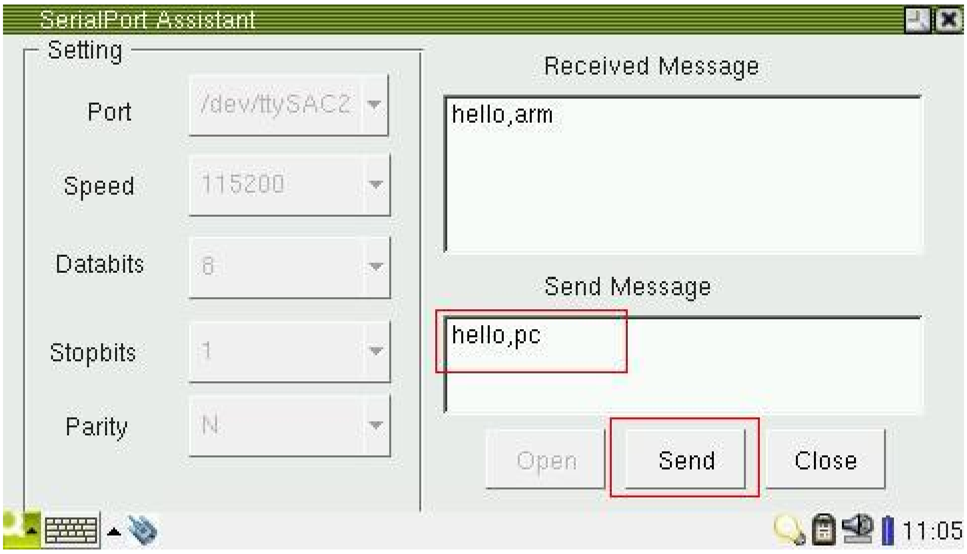
Stopbits 1

Parity N

Received Message

hello,arm

Step5. The board sends data to the PC. Write down "hello,pc" in the send message blank, click "send" button, and then the this message will be shown in the hyper terminal blank.



hello,arm

hello,pc

Step6. Quit from this program. Firstly click the "close"button, then shut down the serial port, finally click the close button on the top right corner.

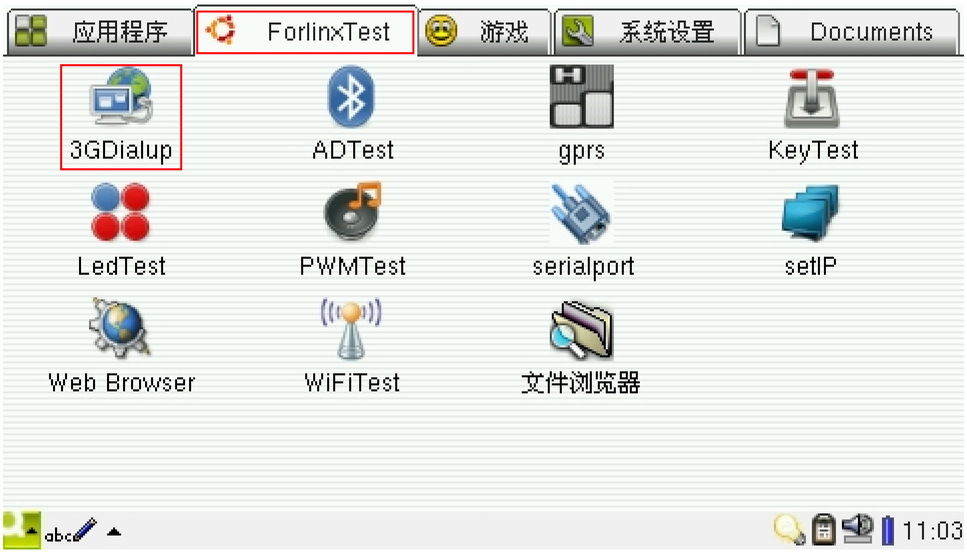
Serialport source code path：
CD\ Linux-3.0.1\apptest\QT ApplicationTest\serialport

Chapter 4 Peripheral modules Test

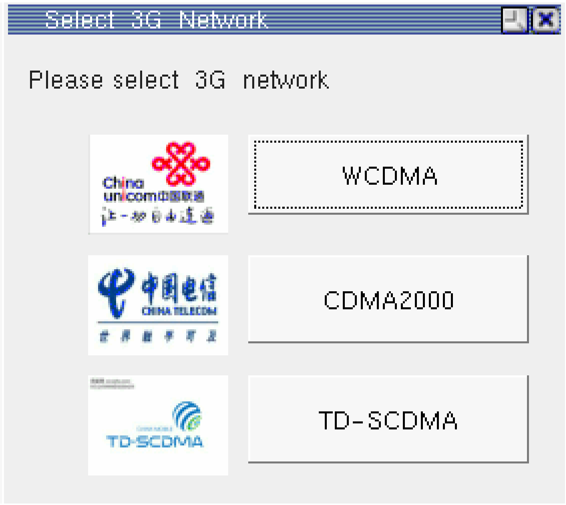
4-1 USB 3G net card test(NIC)

(1)Telecom CDMA 2000 module test

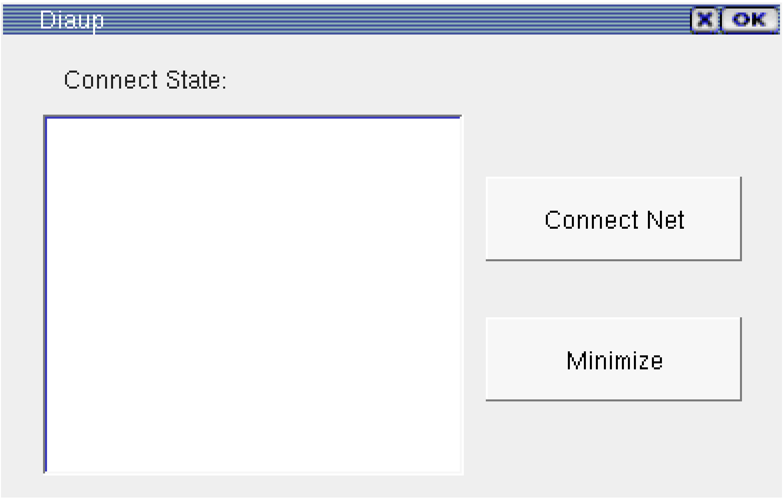
Step1. Insert 3G cellphone card into the USB 3G module
Step2. Power on the board, start Linux system.
Step3. We take a USB 3G module test for example in this chapter. In your practical test, data may be different from results in this chapter due to different chips.
Open ForlinxTest tab on the desktop under qtopia system, you could find” 3GDialup” icon.



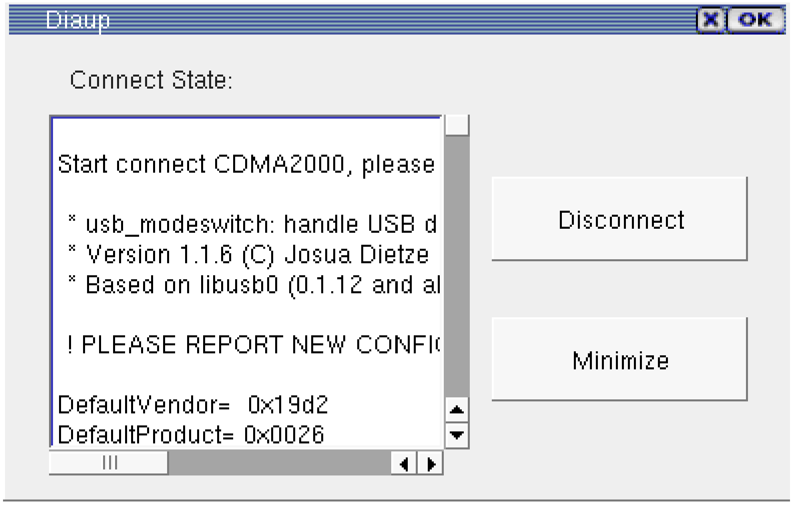
Click” 3GDialup” to start application program, there will be a 3G module control panel.



Click” CDMA2000”, CDMA2000 module control panel appears.



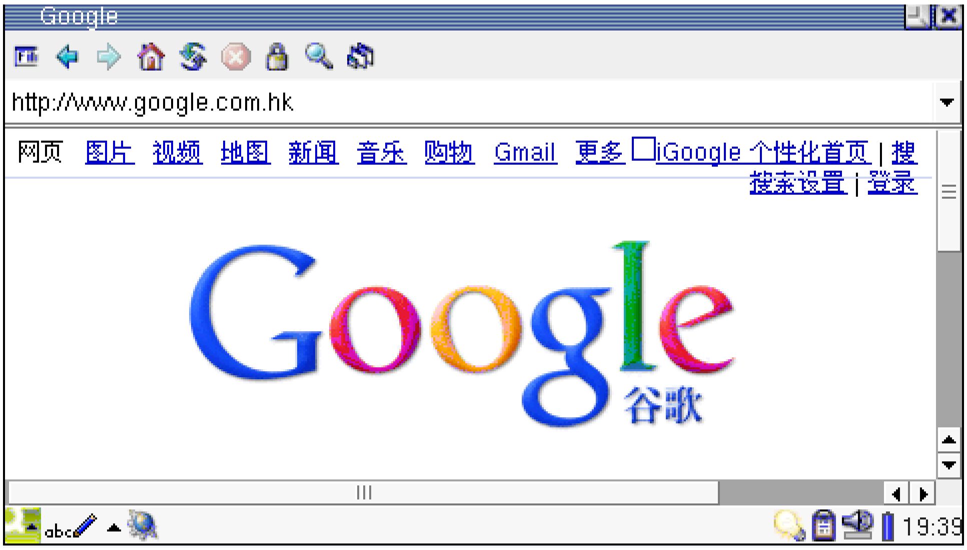
Click"Connect Net", the network connection information of CDMA2000 will be found in the connect state.



```
Start connect CDMA2000, please

 * usb_modeswitch: handle USB d
 * Version 1.1.6 (C) Josua Dietze
 * Based on libusb0 (0.1.12 and al

 ! PLEASE REPORT NEW CONFI(

DefaultVendor=  0x19d2
DefaultProduct= 0x0026
```

Click"Minimize" could realize to minimize the control panel of CDMA2000.

At this time, network has been connected, open internet browser to open the homepage of google.



http://www.google.com.hk

Google
网页 图片 视频 地图 新闻 音乐 购物 Gmail 更多 iGoogle 个性化首页 | 搜
搜索设置 | 登录
Google
谷歌
abc
19:39

Up to now, 3G test programs provided by Forlinx support Modem model:
WCDMA：ForlinxAD3812；
CDMA2000：ZTE-AC581,ZTE-AC582；
TD-SCDMA：HUAWEI-ET127,ZTE-A356；
All models have passed tests,while other models haven't been test at present.

3GTest Source code path:
CD\ Linux-3.0.1\apptest\QT ApplicationTest\3GTest

4-2 CMOS camera OV9650 test

OV9650 camera is optional.

Step1. Power off the board, connect OV9650 camera with CAM interface of the Forlinx board. Note:OV9650 could not operate hot plugging.

Step2. Power on the board,start Linux system.

Step3. Run test command: #testcamera.

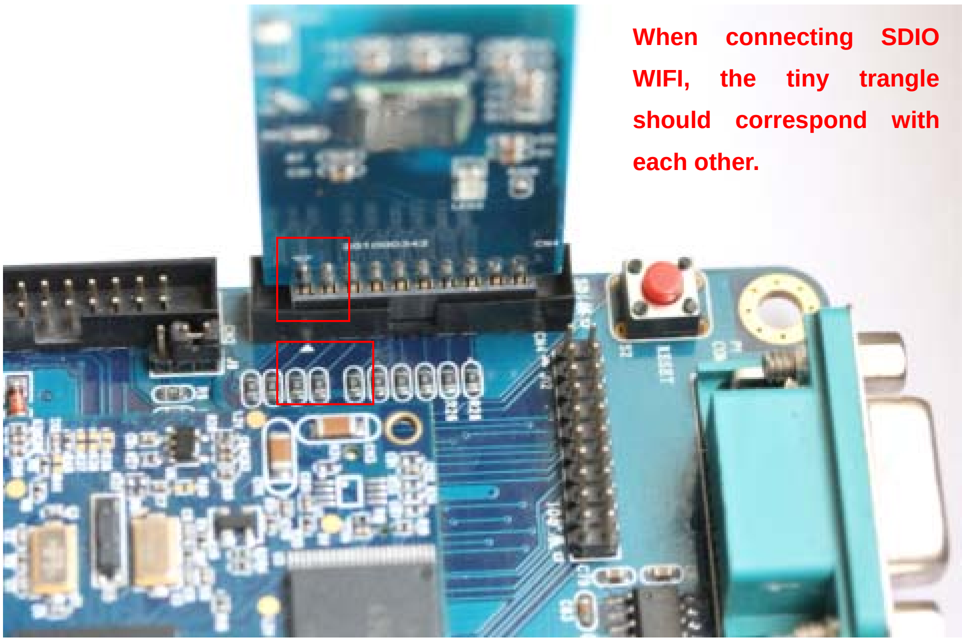
Information sampled by camera will appear on the LCD screen. (The system now is installed with test program of 4.3-inch screen; you are permitted to correct source code according to practical situation.)

Testcamera source code directory : CD\ Linux-3.0.1\apptest\cameratest

Detailed test procedures of CMOS camera could consult relevant sections of multimedia test.

4-3 SDIO WIFI test

SDIO WIFI wireless LAN card is optional .
Physical connection is as follows:



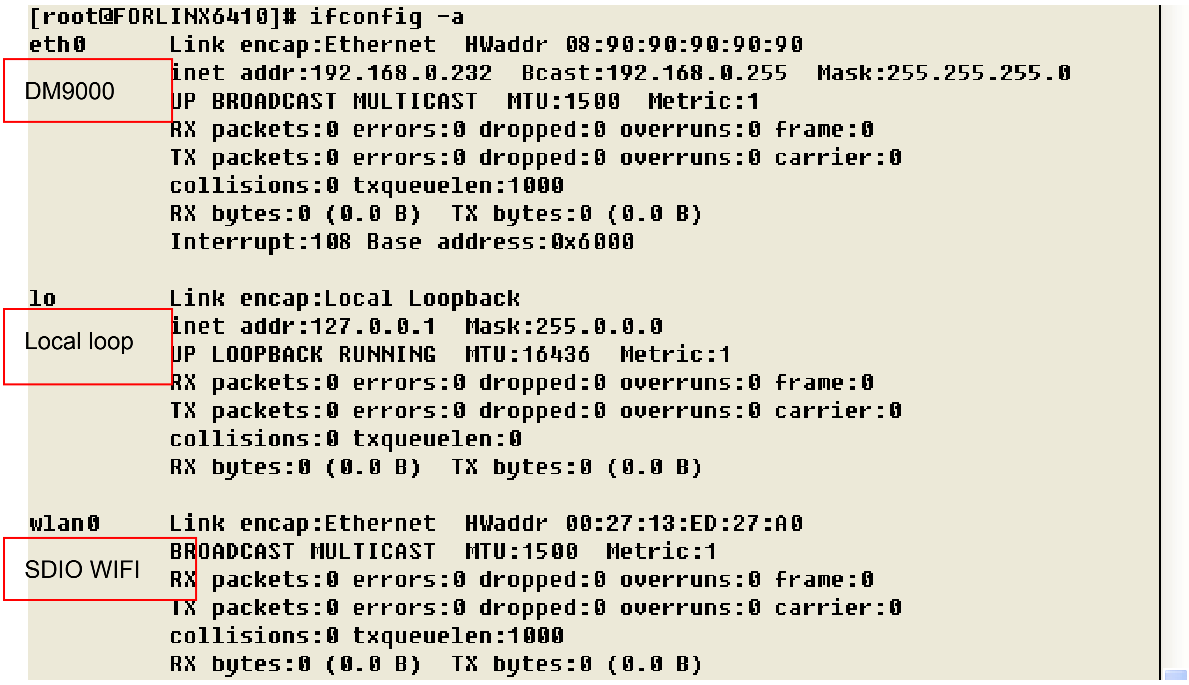
When connecting SDIO WIFI, the tiny trangle should correspond with each other.

Step1. Turn off the power; connect SDIO WIFI with SD interface of Forlinx board.
Step2. Power on the board, start Linux system.
Step3. We take the connection between SDIO WIFI and router as a example in this chapter. Because the network circumstance is different,Please set up under practical situation.

Note: New SDIO WIFI module uses circle to replace the tiny triangle to mark the initiative Pin.

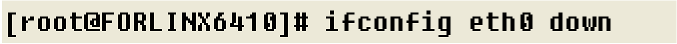
Execute following command to connect router

#ifconfig –a (check condition of net cards)



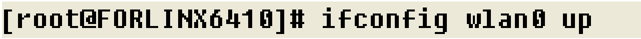
```
[root@FORLINX6410]# ifconfig -a
eth0      Link encap:Ethernet  HWaddr 08:90:90:90:90:90
          inet addr:192.168.0.232  Bcast:192.168.0.255  Mask:255.255.255.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:108 Base address:0x6000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

wlan0     Link encap:Ethernet  HWaddr 00:27:13:ED:27:A0
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

#ifconfig eth0 down （Close dm9000 net card）



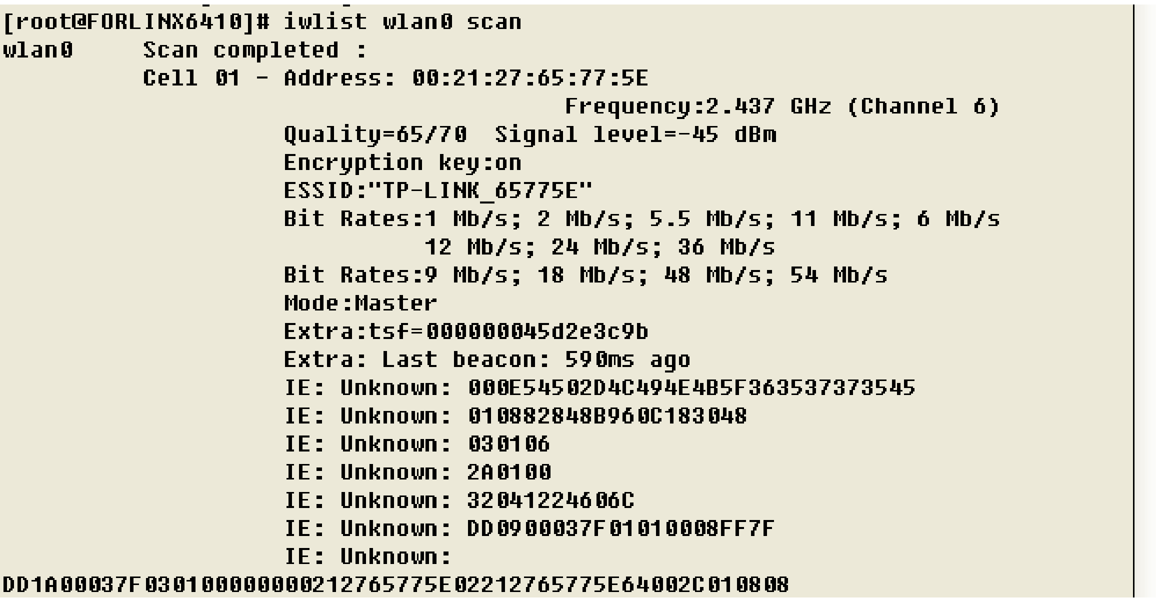
```
[root@FORLINX6410]# ifconfig eth0 down
```

#ifconfig wlan0 up （start SDIO WIFI）



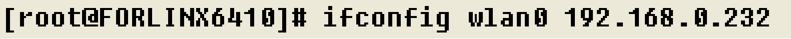
```
[root@FORLINX6410]# ifconfig wlan0 up
```

#iwlist wlan0 scan （Using SDIO WIFI to scan wireless network machine）



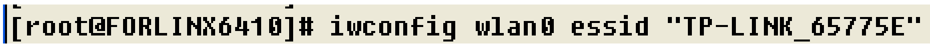
```
[root@FORLINX6410]# iwlist wlan0 scan
wlan0     Scan completed :
          Cell 01 - Address: 00:21:27:65:77:5E
                              Frequency:2.437 GHz (Channel 6)
                    Quality=65/70  Signal level=-45 dBm
                    Encryption key:on
                    ESSID:"TP-LINK_65775E"
                    Bit Rates:1 Mb/s; 2 Mb/s; 5.5 Mb/s; 11 Mb/s; 6 Mb/s
                              12 Mb/s; 24 Mb/s; 36 Mb/s
                    Bit Rates:9 Mb/s; 18 Mb/s; 48 Mb/s; 54 Mb/s
                    Mode:Master
                    Extra:tsf=000000045d2e3c9b
                    Extra: Last beacon: 590ms ago
                    IE: Unknown: 000E54502D4C494E4B5F363537373545
                    IE: Unknown: 010882848B960C183048
                    IE: Unknown: 030106
                    IE: Unknown: 2A0100
                    IE: Unknown: 32041224606C
                    IE: Unknown: DD0900037F01010008FF7F
                    IE: Unknown:
DD1A00037F030100000000212765775E02212765775E64002C010808
```

#ifconfig wlan0 192.168.0.232 （Setup IP of SDIO WIFI）



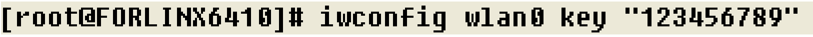
```
[root@FORLINX6410]# ifconfig wlan0 192.168.0.232
```

#iwconfig wlan0 essid “TP-LINK_65775E” (Setup essid)



```
[root@FORLINX6410]# iwconfig wlan0 essid "TP-LINK_65775E"
```

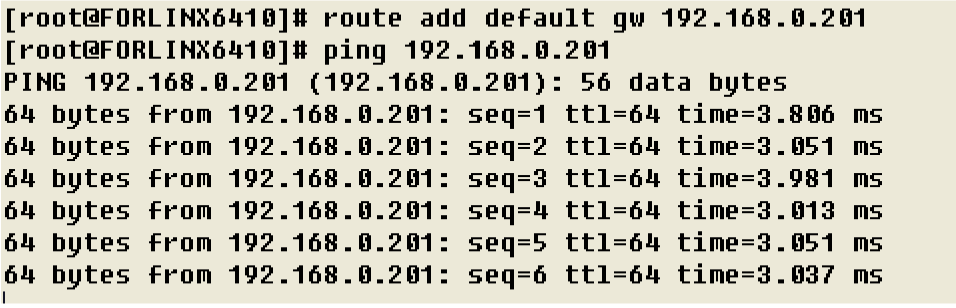
#iwconfig wlan0 key “123456789” (Stup password of router)



```
[root@FORLINX6410]# iwconfig wlan0 key "123456789"
```

#route add default gw 192.168.0.201 （Setup gateway）

#ping 192.168.0.201 （Ping gateway）



```
[root@FORLINX6410]# route add default gw 192.168.0.201
[root@FORLINX6410]# ping 192.168.0.201
PING 192.168.0.201 (192.168.0.201): 56 data bytes
64 bytes from 192.168.0.201: seq=1 ttl=64 time=3.806 ms
64 bytes from 192.168.0.201: seq=2 ttl=64 time=3.051 ms
64 bytes from 192.168.0.201: seq=3 ttl=64 time=3.981 ms
64 bytes from 192.168.0.201: seq=4 ttl=64 time=3.013 ms
64 bytes from 192.168.0.201: seq=5 ttl=64 time=3.051 ms
64 bytes from 192.168.0.201: seq=6 ttl=64 time=3.037 ms
```

The router tested in this chapter could visit internet, so that you could surf on the internet using QTOPIA browser.

4-4 Serial expansion board

Serial expansion board is an optional module which is specially used for OK6410 board. It is not needed by TE6410.
Main function of the expansion board:

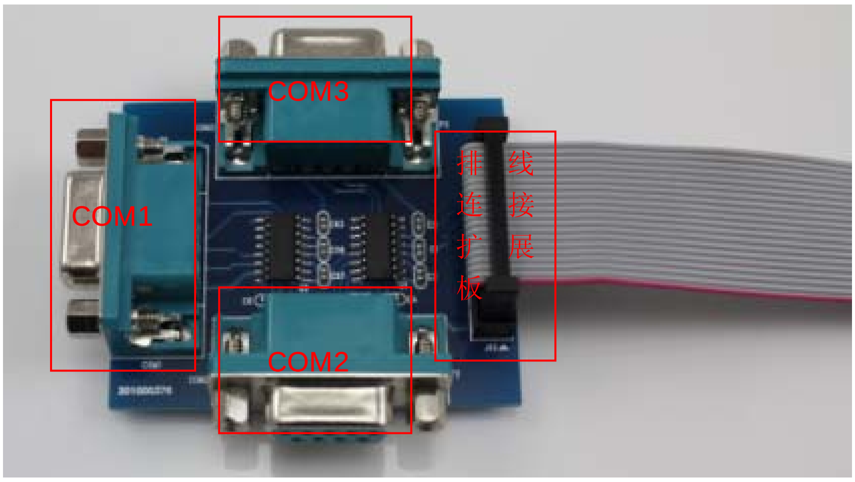
1.Physical interface conversion. Converse 20pin flat cable interface to DB9 female socket interface; it is very convenient to use serial port cable to connect board and peripheral serial device .

2.Electrical level interface conversion. converse ttl level to RS232 level through ttl to rs232 level chip. COM1 in the expansion board is a five-line serial, COM2, COM3 are three-line serials. You could connect your peripheral devices according to real situation.

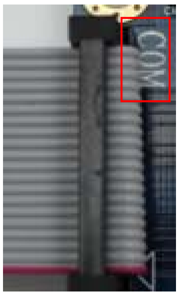
Line sequence of 3 serial ports :

	COM1	COM2	COM3
1	GND	GND	GND
2	TXD1	TXD2	TXD3
3	RXD1	RXD2	RXD3
4			
5	GND	GND	GND
6	GND	GND	GND
7	CTSN1		
8	RTXN1		
9			

Serial expansion board could directly connect with the COM interface of the Forlinx OK6410 board.



排线接开发板 ”COM”口



COM1、COM2、COM3 的设备结点路径分别为：

the device node path of COM1、COM2、COM3 respectively are:
/dev/ttySAC1
/dev/ttySAC2
/dev/ttySAC3

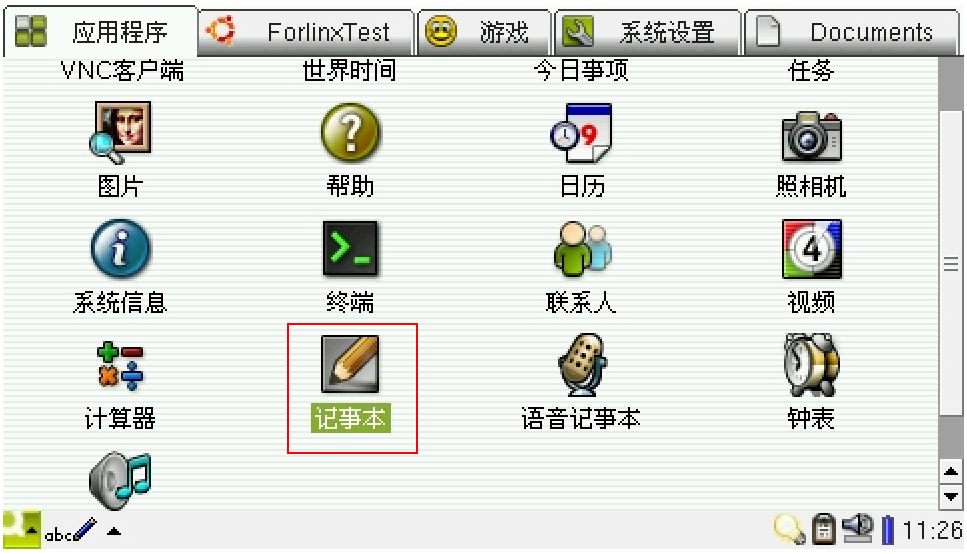
4-5 4X4 and 8X8 matrix keyboard

Forlinx OK6410 could connect with 4X4 and 8X8 matrix keyboard.

At present, zImage could identify the 4x4 and 8x8 matrix board. You just need to correctly connect the board and keyboard.

Connection method: connect matrix keyboard that is connected with flat cable provided by Forlinx and key interface in the board.

Open a notepad in the QT system, press the key of matrix keyboard, you will find changes that have occurred in the notepad.



Note: the keyboard driver only could provide limited key value. If it is need to be expanded, please add it by yourself by referring to the driver program.

4-6 USB camera

Forlinx Linux 3.0 system have the USB camera driver, the present test program only could support YUV camera, we will continually to perfect test code to support more USB cameras.

Connect USB camera with the USB port in the board, run command #test_usb_camera. A sampled dynamic image will appear on the LCD.

Test_usb_camera source code path: CD\ Linux-3.0.1\apptest\testUsbCamera

4-7 485 Interface

Only TE6410 is equipped with the RS485 interface. And the driver has been installed in the kernel. The device nodes of TE6410 is /dev/ttySAC3.

4-8 CAN module

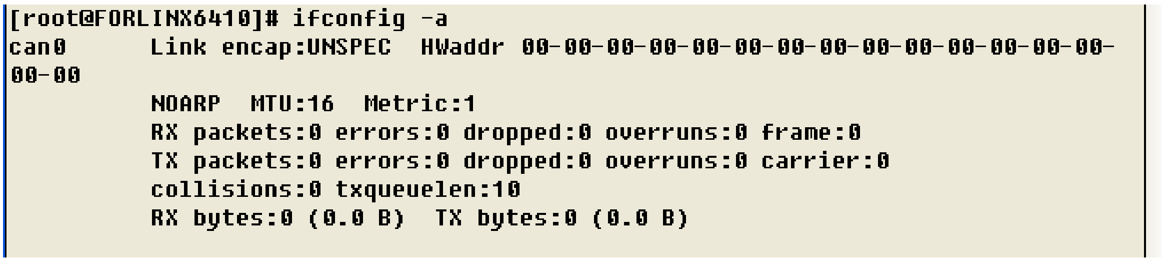
TE 6410 equips industrialized CAN transceiver which consists of MCP2515 and MCP2551. Base on the Forlinx CAN module, OK6410 could develop a similar CAN transceiver which is same as the one used in the TE6410.

Connection method: Using flat cable provided by Forlinx to connect CAN module and IO interface in the Forlinx board.

CAN have many test tools. Here we just take the Forlinx6410 board as an example,

Firstly I want to explain that the "can" driver provided by Forlinx is socket can.application program could complie program just like operating a network node. Socket Programming could realize the transmit of the CAN message.

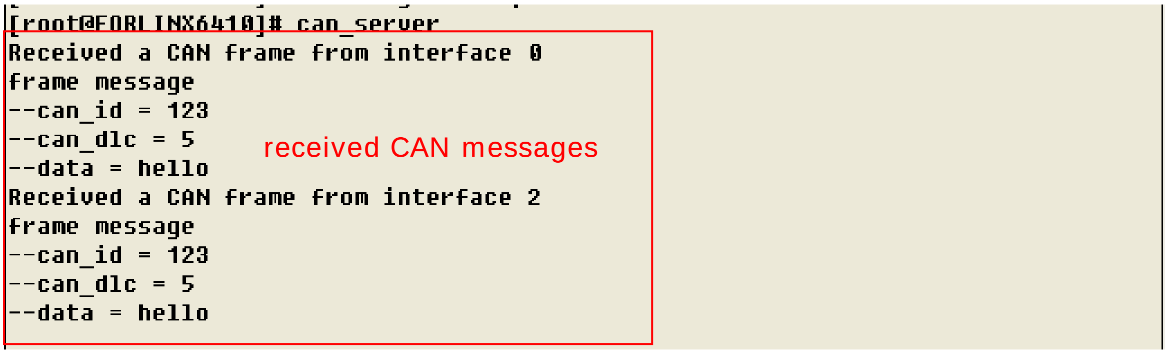
Step1. Check can node #ifconfig –a, socket can message is as follows:



```
[root@FORLINX6410]# ifconfig -a
can0      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-
00-00
          NOARP  MTU:16  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Step2. Set up CAN baud rate
#up link set can0 up type can bitrate 250000(250000 is the baud rate.)

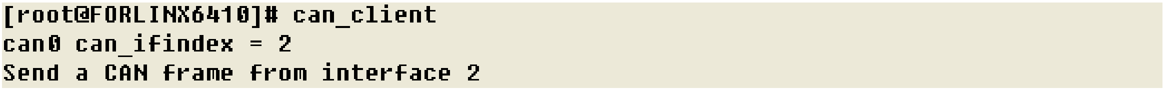
Step3. Run test program
One board runs the #can_server command; then, the other board runs #can_client command.
The board runs the #can_server command will receive messages from the board runs #can_client command.
Serial port of the board that runs can_server command will show the following information:



```
[root@FORLINX6410]# can_server
Received a CAN frame from interface 0
frame message
--can_id = 123
--can_dlc = 5
--data = hello
Received a CAN frame from interface 2
frame message
--can_id = 123
--can_dlc = 5
--data = hello
```

received CAN messages

Serial port which runs #can_client command will show the following information:

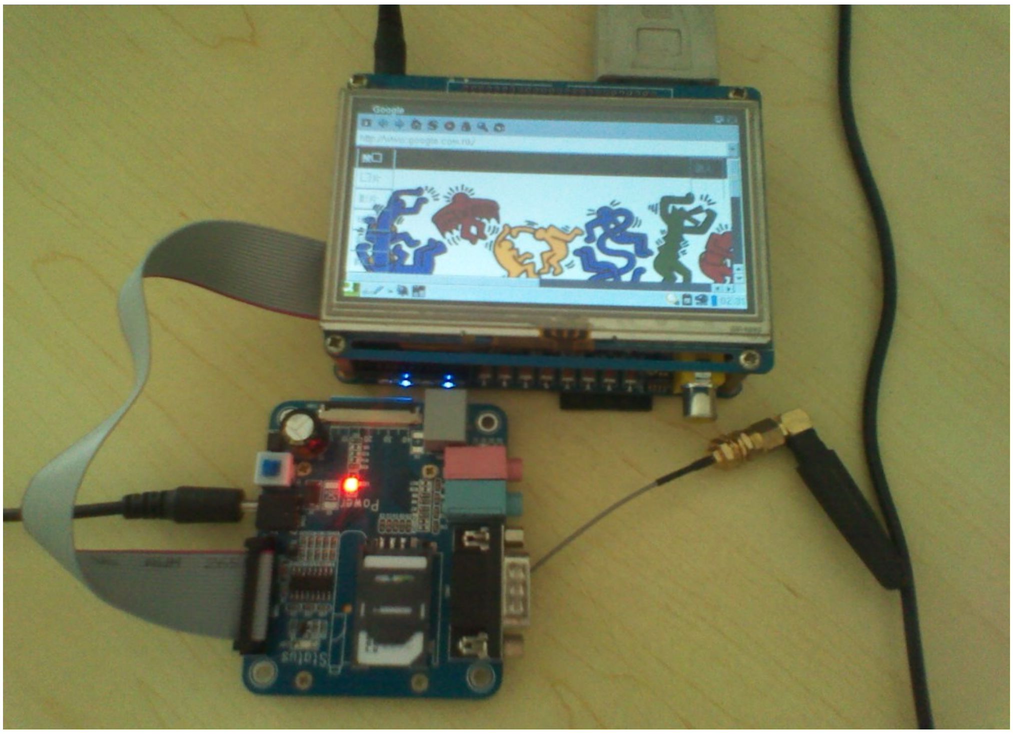


```
[root@FORLINX6410]# can_client
can0 can_ifindex = 2
Send a CAN frame from interface 2
```

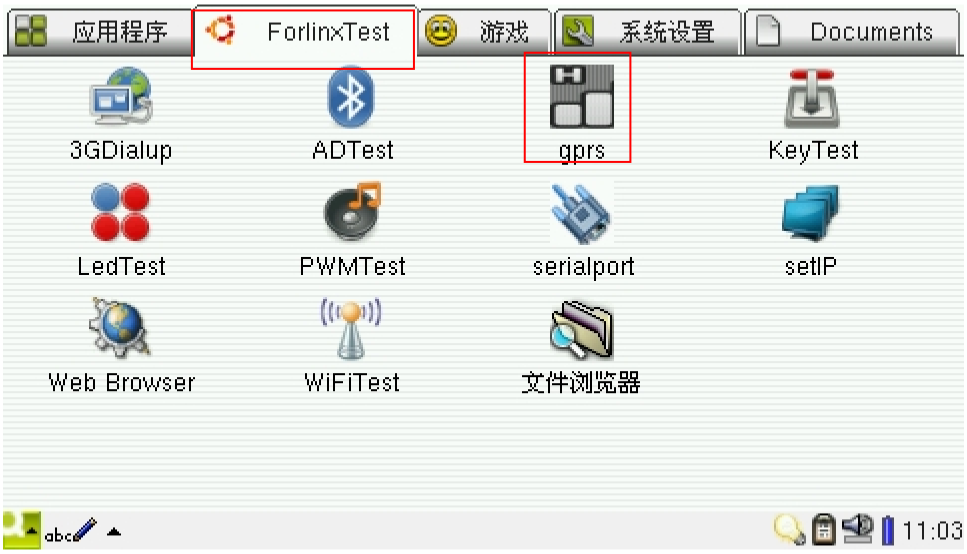
Up,can_server,can_client source code path:CD\Linux-3.0.1\apptest\can

4-9 GPRS module test

Connection method: Directly connect the Forlinx GPRS module which is inserted with a mobile phone card with the 20pin COM port of OK6410 board by JTAG cable. The connection is as the following picture. Connect both the board and the GPRS module with the 5V power adapter.

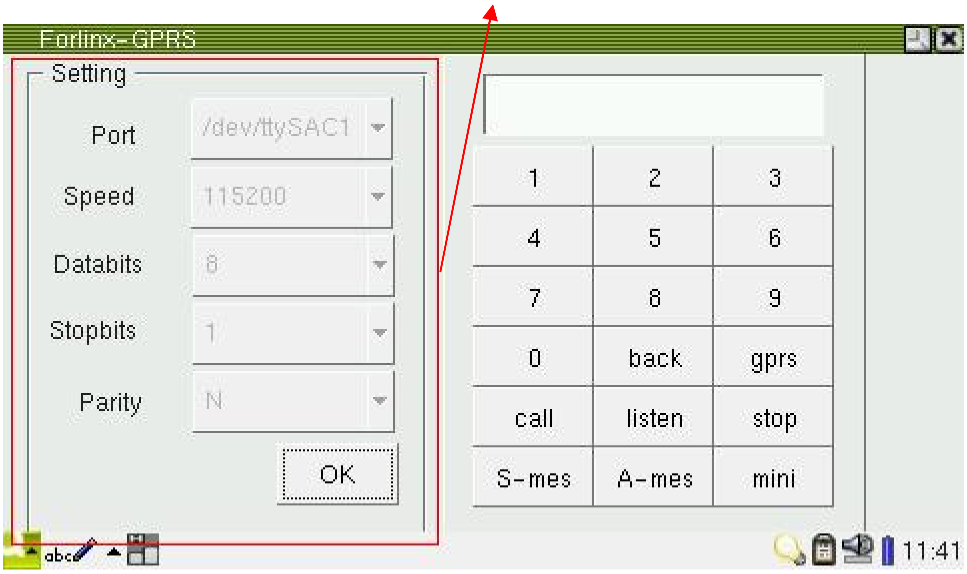


Step1. Running the software. Click the ForlinxTest optional label in the qtopia desktop, the "gprs" icon will be found.



Step2. Setup the serial port. Setup the serial port information on the part. The/dev/ttySAC is defaulted. Click "OK"to complete the setting. After that, the serial port setting options will become the light gray color. If the setting is wrong, please restart this software.

Serial setting will become grey after pressing the OK button.


Forlinx-GPRS

Setting

Port /dev/ttySAC1

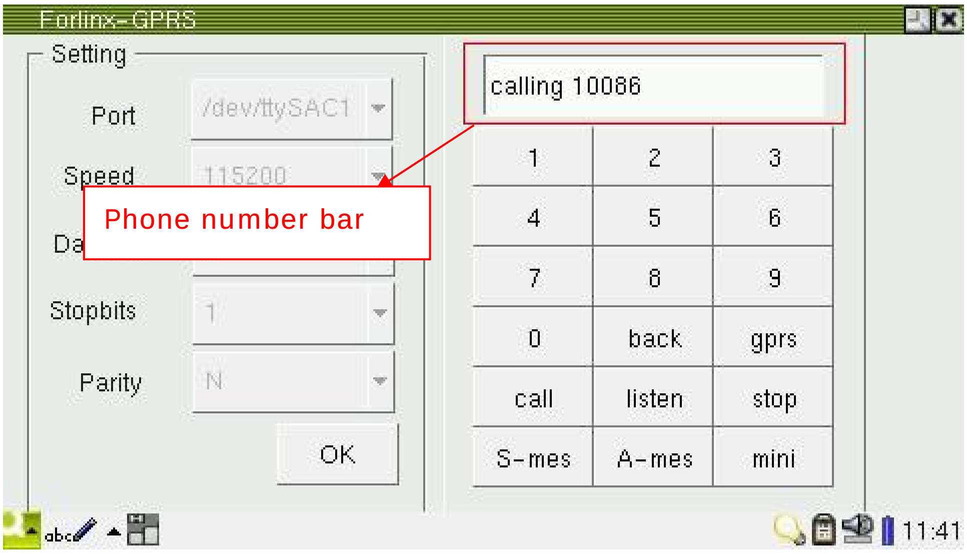
Speed 115200

Databits 8

Stopbits 1

Parity N

Step3. Making a phone call. After setting the serial port, type in the phone number, click the "call" to make a phone call. The phone number bar will show "calling ******* "



Forlinx-GPRS

Setting

Port /dev/ttySAC1

Speed 115200

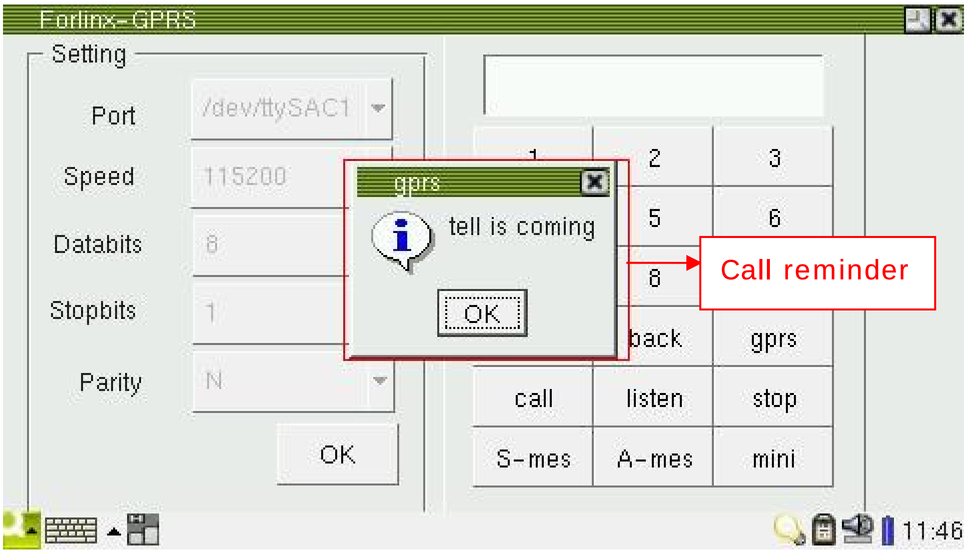
Stopbits 1

Parity N

calling 10086

Phone number bar

Step4. Phone call monitoring. If there is a phone call, a call reminder will pop up.



Forlinx-GPRS

Setting

Port /dev/ttySAC1

Speed 115200

Databits 8

Stopbits 1

Parity N

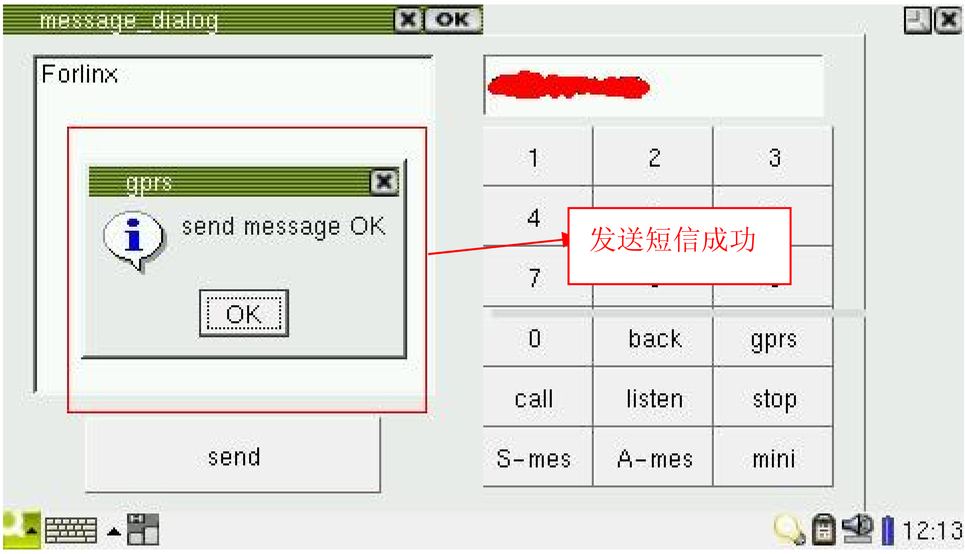
gprs

tell is coming

Call reminder

Click"listen" to go on a conversation, click "stop" to hang up the phone call.

Step5. Send message.Type in the phone number in the telephone number bar, click"S-mes"button to edit the message. Click"send" button to send message.



message_dialog

Forlinx

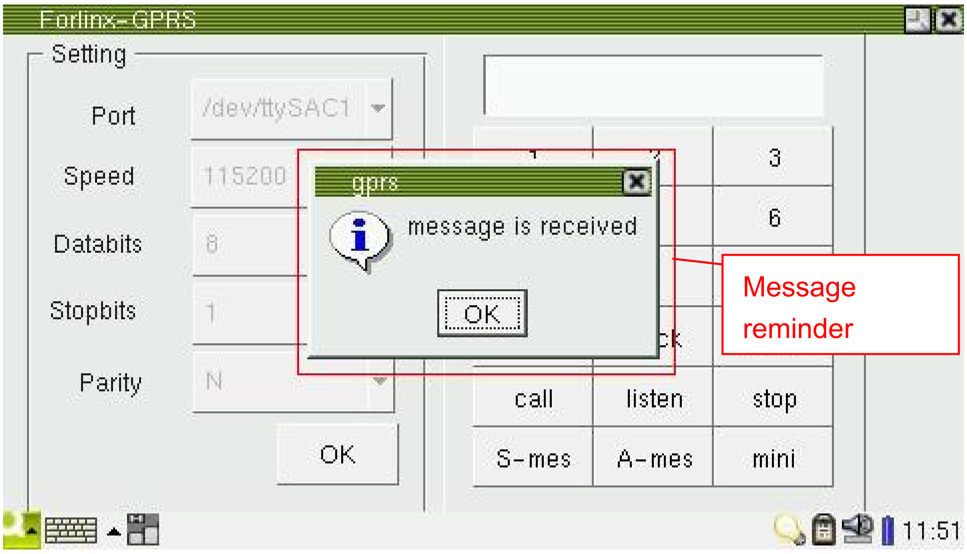
[redacted]

gprs

send message OK

发送短信成功

Step6. Monitor the messages. If a message is coming, a SMS reminder will pop up.



Forlinx-GPRS

Setting

Port /dev/ttySAC1

Speed 115200

Databits 8

Stopbits 1

Parity N

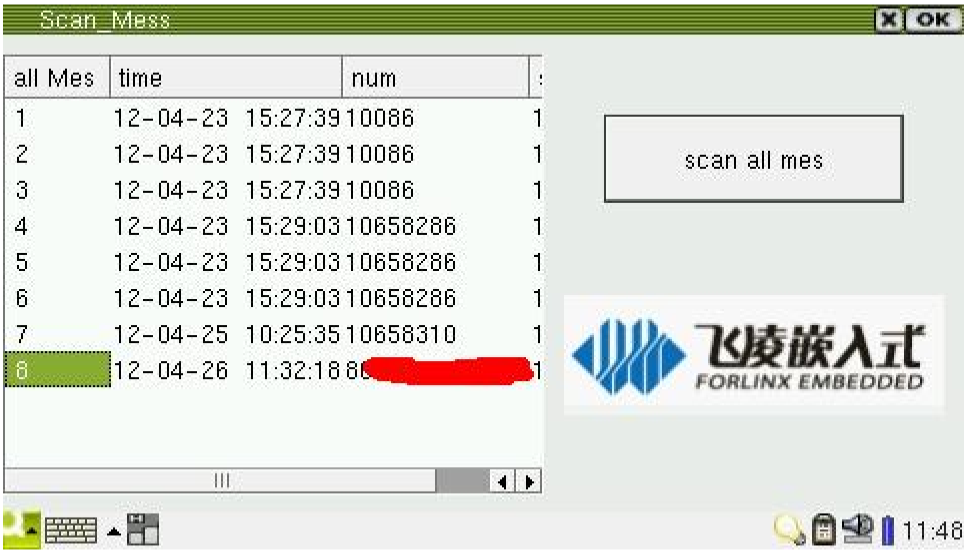
gprs

message is received

Message reminder

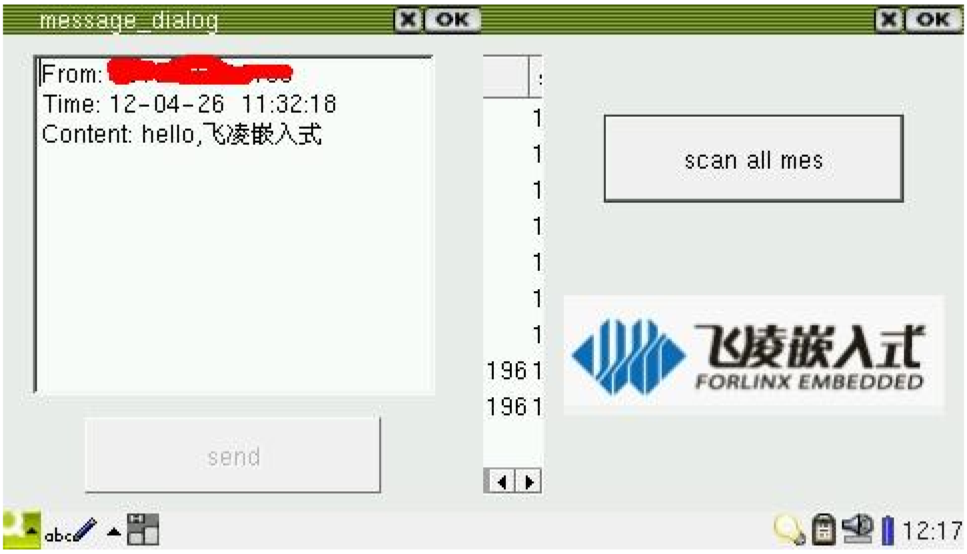
Step7. Checking SMS.Click"A-mes"button, SMS browsing and dialogue box will be pop up, and then click"scan all mes"button to browse all short messages.

Note: Before clicking the "A-mes"button, you must make sure that the phone number bar is vacant, or the software will automatically enter into the short message editing mode.



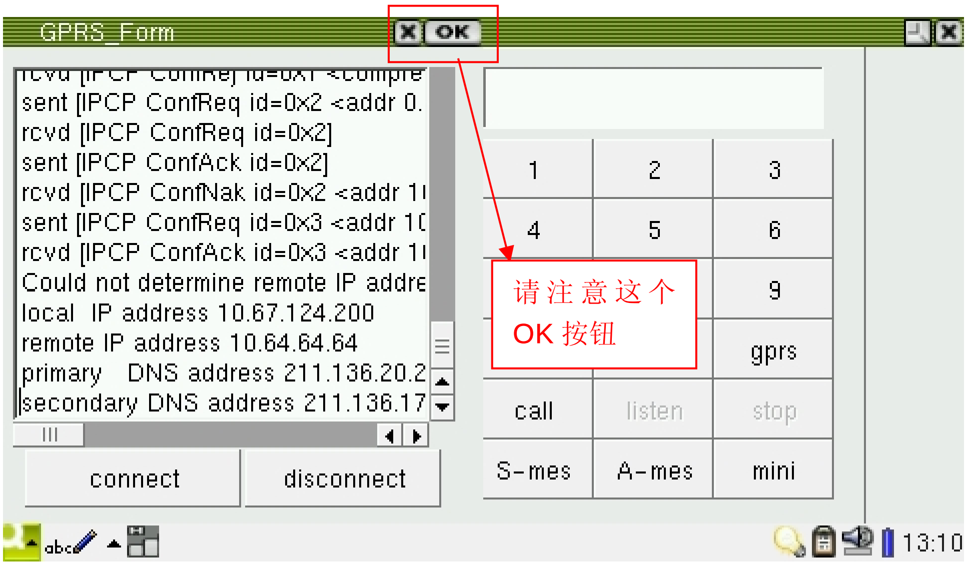
all Mes	time	num	
1	12-04-23 15:27:39	10086	1
2	12-04-23 15:27:39	10086	1
3	12-04-23 15:27:39	10086	1
4	12-04-23 15:29:03	10658286	1
5	12-04-23 15:29:03	10658286	1
6	12-04-23 15:29:03	10658286	1
7	12-04-25 10:25:35	10658310	1
8	12-04-26 11:32:18	8[redacted]	1

Double click one of the messages, the short message content will be displayed.



From: [redacted]
Time: 12-04-26 11:32:18
Content: hello,飞凌嵌入式

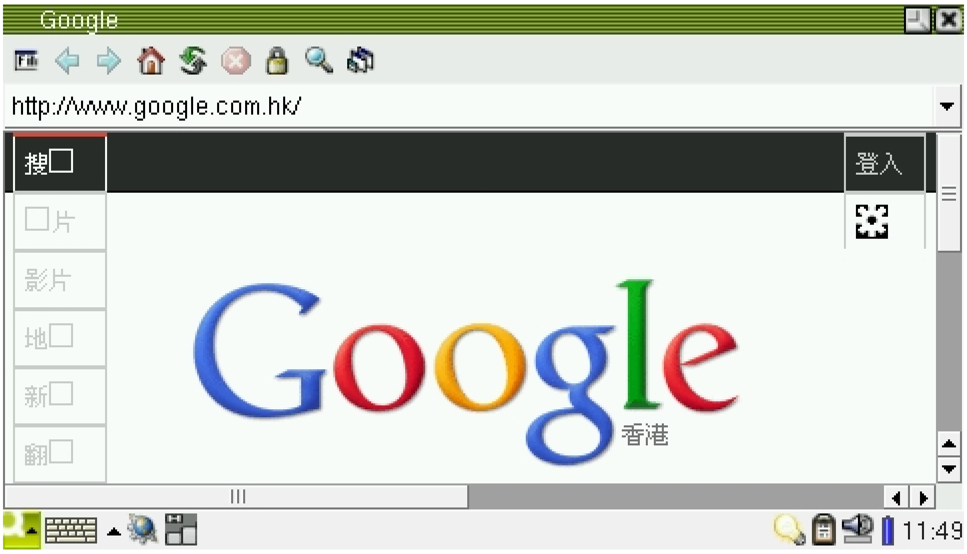
Step8. Test the net surfing function of the gprs. Click the "gprs"button in the main interface,the gprs diaglogue box will be pop up, and then click the "connect" button to dial-up.



```
rcvd [IPCP ConfRej id=0x1 <compre
sent [IPCP ConfReq id=0x2 <addr 0.
rcvd [IPCP ConfReq id=0x2]
sent [IPCP ConfAck id=0x2]
rcvd [IPCP ConfNak id=0x2 <addr 1(
sent [IPCP ConfReq id=0x3 <addr 1(
rcvd [IPCP ConfAck id=0x3 <addr 1(
Could not determine remote IP addre
local  IP address 10.67.124.200
remote IP address 10.64.64.64
primary   DNS address 211.136.20.2
secondary DNS address 211.136.17
```

请注意这个
OK 按钮

Click the "Ok" button on the top right corner of the gprs interface, and then click the "mini" button to minimum the interface to the taskbar,start the browser.



http://www.google.com.hk/

Note： because there is only one serial port in the GPRS module,the serial port will be occupied after been started, then you are not allowed to make a phone call or send short messages. Moreover, this software does not support the overlength messages at present.

Gprs source code path:
CD\ Linux-3.0.1\apptest\QT ApplicationTest\gprs

Chapter5 Establishment of Linux development environment on the host computer

Development environment here are regarded as softwares and hardwares which is needed during the process of the development. Development environment is not in a firm or fixed pattern. Here we introduce in details about the establishment method of an embedded Linux development environment. If you are familiar with the embedded development, you could establish it depend on your own request.you could search for relevant information in some large-scale Linux forums and websites to dispose Wrong messages happened because of environment that different from that in this manual. The environment introduced in this chapter has been tested by Forlinx; friends who are not experienced in the embedded development could establish the environment by methods given by Forlinx. Friends could trust our company and establish development environment according to the methods in this manual.

File paths needed in this chapter

file name	Paths in the CD
ubuntu-9.10-desktop-i386.iso (ubuntu9.10image installation)	CD\Utilities\
FORLINX_linux-3.0.1.tar.gz (Linux-3.0.1 source code compressed package)	CD\Linux-3.0.1\kernel_sourcecode\

5-1 Installation of Ubuntu 12.04

Ubuntu is a Linux operation system which is mainly dominated by desktop application. Ubuntu not only has a lot of advantages, but also owns praticular superiority comparing with other versions of Linux. At first, installation system is very simple and could be finished after several steps operation, which is as prefect as the desktop system of Windows; secondly, graphical interface is more humanized, which imitates shortcut key under the XP system; thirdly, this system could install necessary file packages by itself under the network environment at the time of installation and updating, you will not worry about the dependency relationship of Linux system any more. Considering the using habit and study necessaries, we suggest you to select the Ubuntu Linux.

Ubuntu9.10 image‘ubuntu-9.10-desktop-i386.iso’of is provided in the CD.it is under the CD\utilities, and could be burned as a system installation disk.

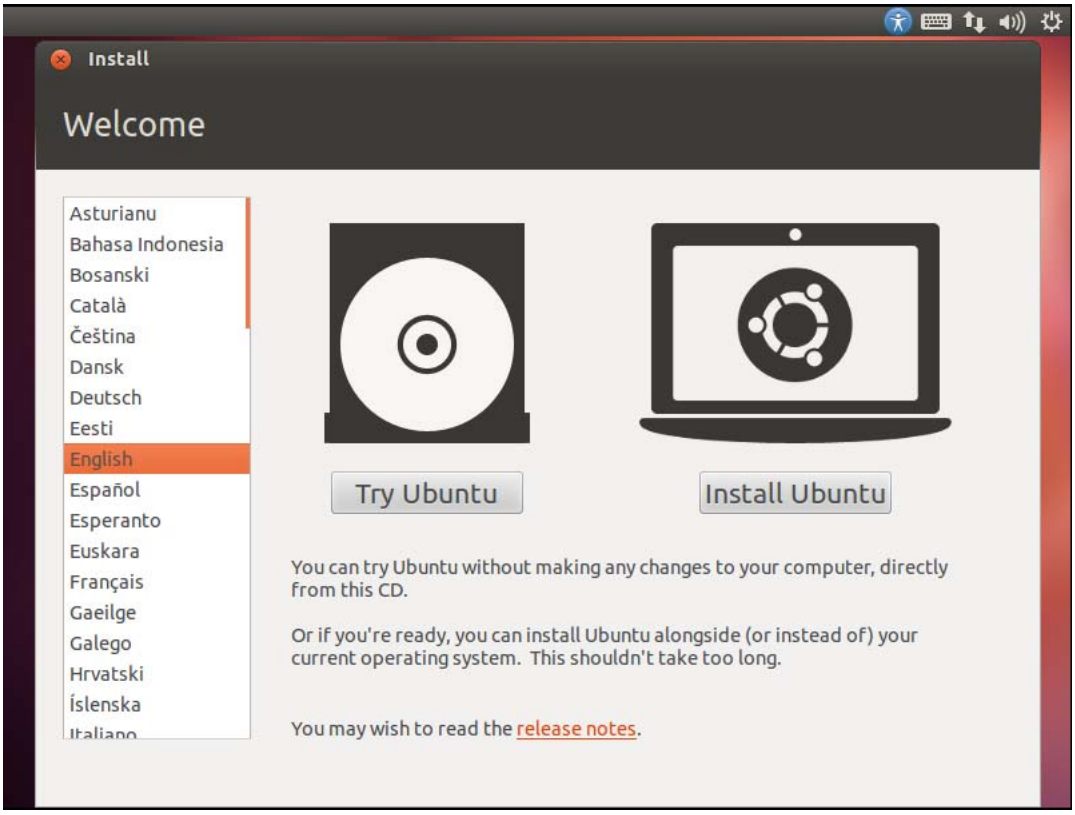
There are various Linux desktop system version , all experiments and source code could pass test in Ubuntu9.10 version. Gcc compiler and library files will have related problems when using other version of Linux desktop system. You could consult and check on the official forums build by Linux system publisher. We strongly suggest you use methods provided by Forlinx, if you are not familiar with it.

Official website of :Ubuntu ： http://www.ubuntu.org.cn
Each version of Ubuntu could be found and downloaded. Some other information of Ubuntu were also could be found.
A lot of practical Ubuntu resources and relevant Chinese forums could be found. In addition, Ubuntun also has its English forum.

Note: Considering many users demand, Forlinx selects 32 bit Ubuntu12.04, not the 64 bit Ubuntu12.04.

Let's start the installation.
Step1. At first, prepare an Ubuntu9.10 installation CD. Insert the CD into the CD-ROM, set up "boot from CD" in the PC bios, start PC.

Step2. Start PC, there will be an pop-up window for selecting installation language. Select the displayed language in the installation process by using the direction key on PC keyboard. Here we choose English.

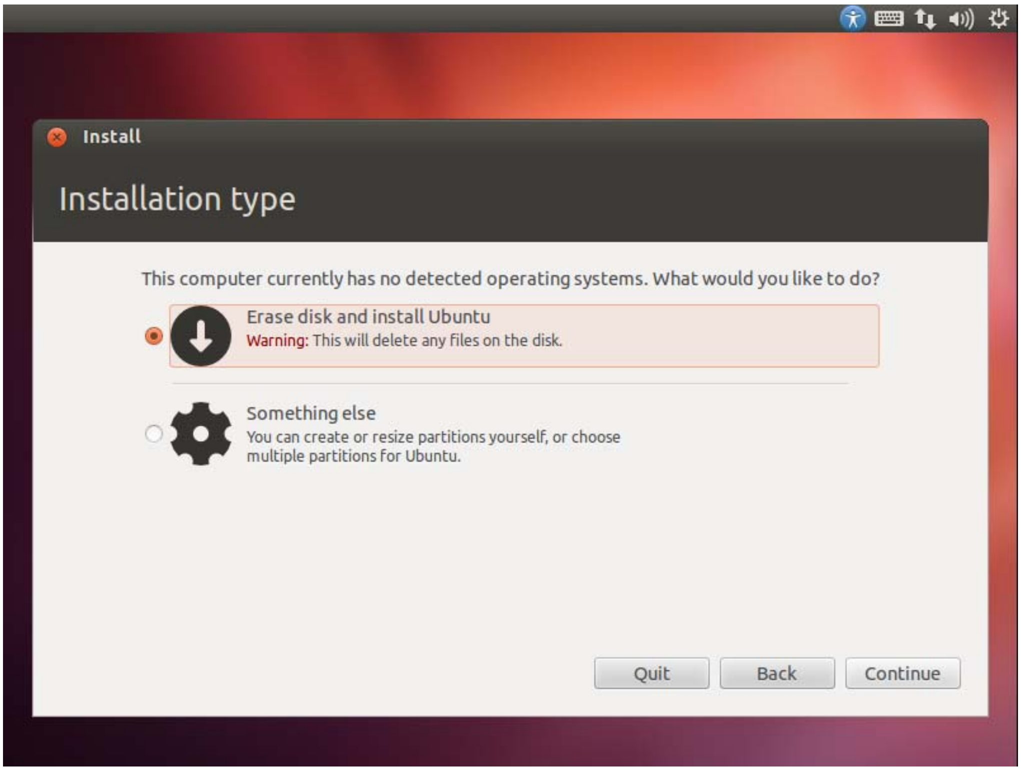


You can try Ubuntu without making any changes to your computer, directly from this CD.

Or if you're ready, you can install Ubuntu alongside (or instead of) your current operating system. This shouldn't take too long.

You may wish to read the release notes.

Step3. Select "Install Ubuntu".



Install

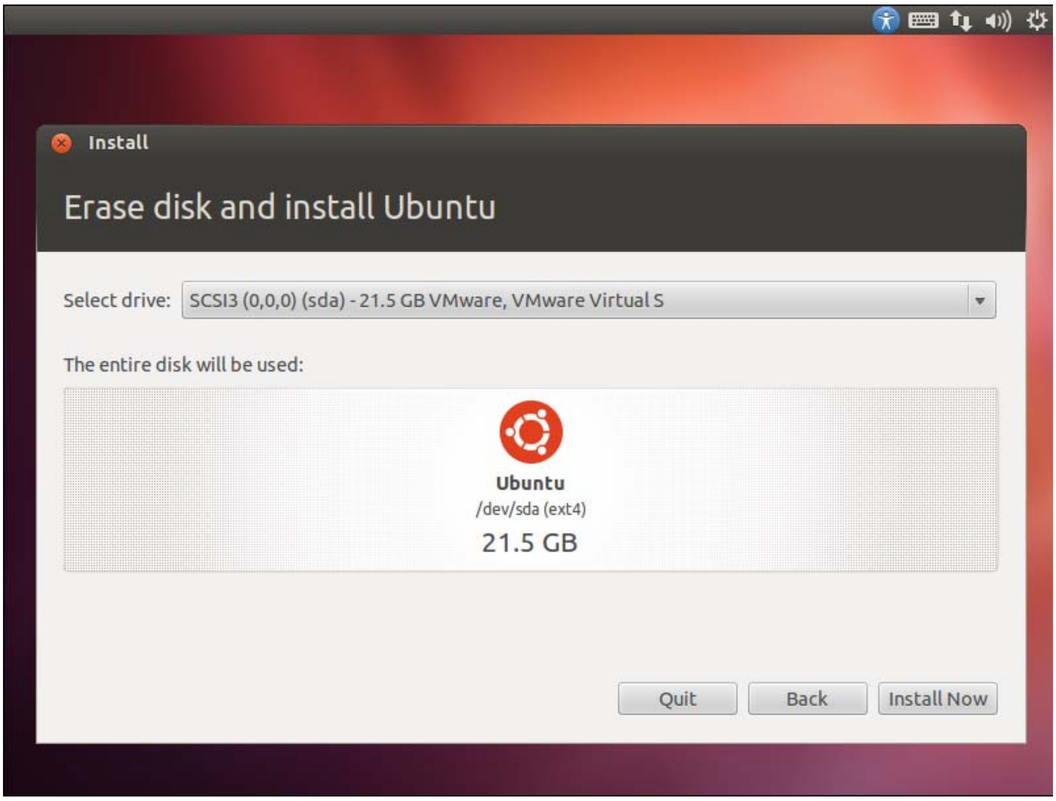
Installation type

This computer currently has no detected operating systems. What would you like to do?

● Erase disk and install Ubuntu
Warning: This will delete any files on the disk.

○ Something else
You can create or resize partitions yourself, or choose multiple partitions for Ubuntu.

Continue:



Install

Erase disk and install Ubuntu

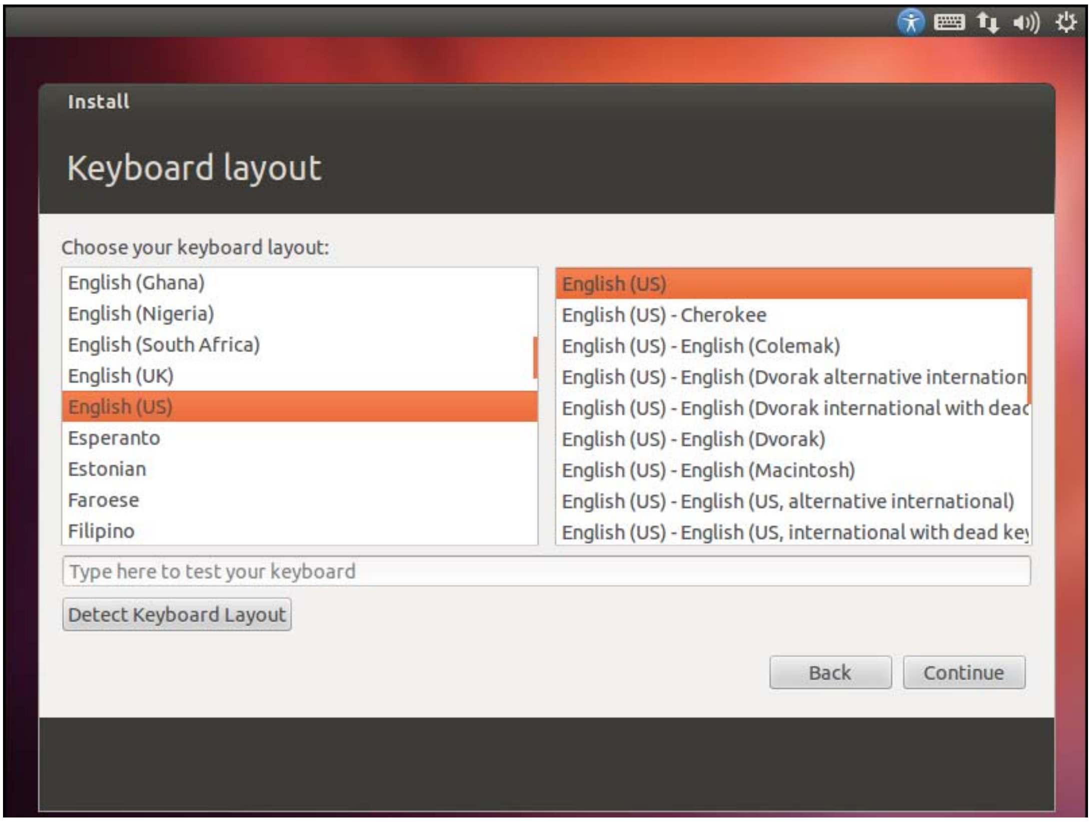
Select drive: SCSI3 (0,0,0) (sda) - 21.5 GB VMware, VMware Virtual S

The entire disk will be used:

Ubuntu
/dev/sda (ext4)
21.5 GB

Configuration of the hardware space and mount points. Here we choose the default value, or you could setup according to your self-demand.

Click the "Install Now".



Install

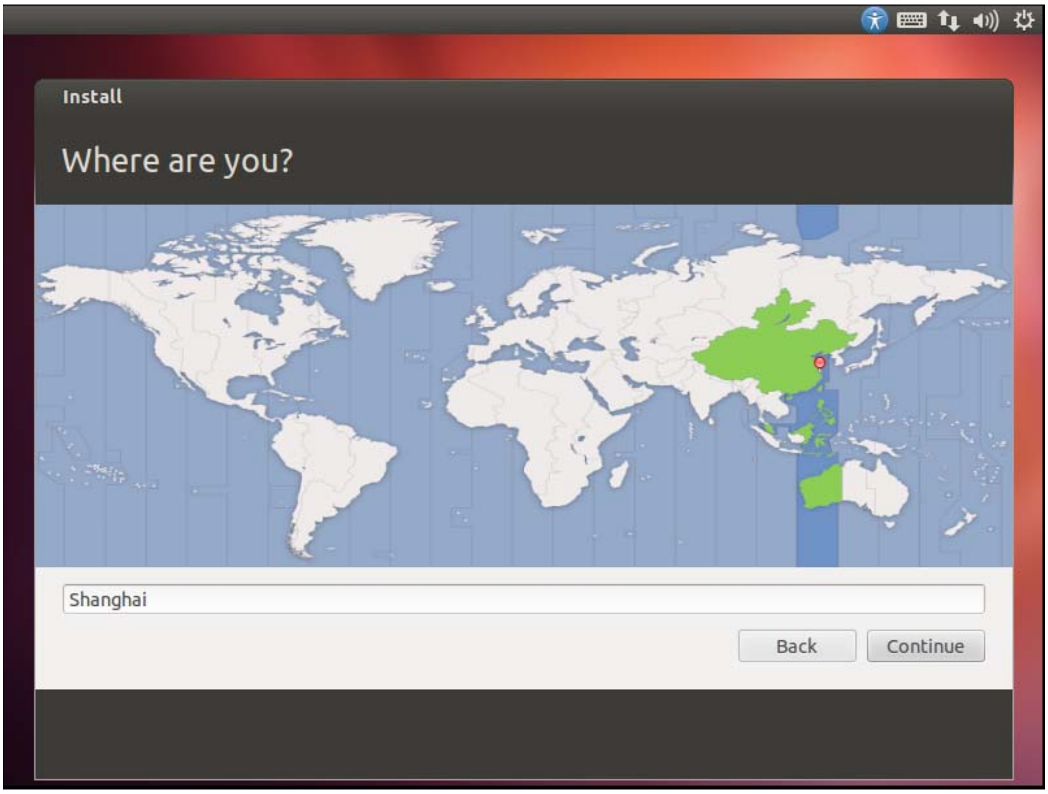
Keyboard layout

Choose your keyboard layout:

English (Ghana)	English (US)
English (Nigeria)	English (US) - Cherokee
English (South Africa)	English (US) - English (Colemak)
English (UK)	English (US) - English (Dvorak alternative internation
English (US)	English (US) - English (Dvorak international with deac
Esperanto	English (US) - English (Dvorak)
Estonian	English (US) - English (Macintosh)
Faroese	English (US) - English (US, alternative international)
Filipino	English (US) - English (US, international with dead key

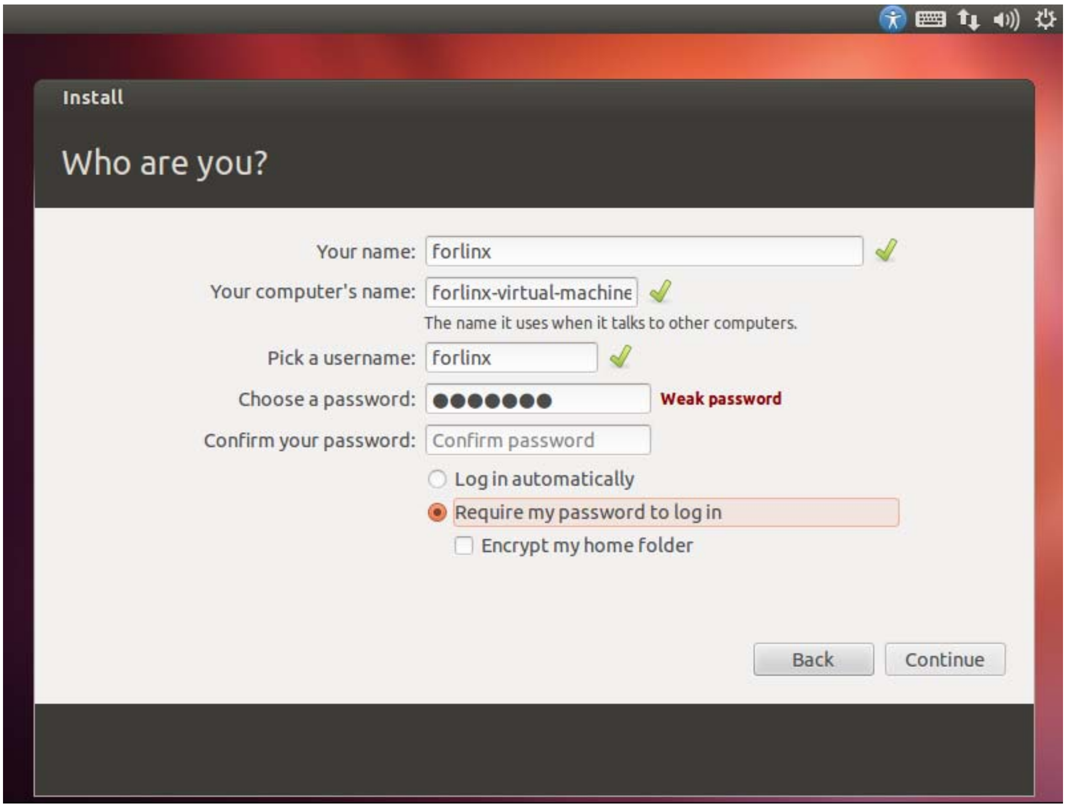
Type here to test your keyboard

Select “keyboard layout”,the default setting is OK, and then click "Continue".



Shanghai

Select the location "shanghai", and then click the "Continue".



Your name: forlinx ✓

Your computer's name: forlinx-virtual-machine ✓

The name it uses when it talks to other computers.

Pick a username: forlinx ✓

Choose a password: ●●●●●●● Weak password

Confirm your password: Confirm password

○ Log in automatically

● Require my password to log in

□ Encrypt my home folder

Type in the system username and password.
Note:the user name here are normal users who does not have the root user privilege. And how to log in as a root ? The next section will give you detailed introduction.

Click the "Continue", the installation will be completed.

5-2 The Ubuntu is set up as"log in as a root user"

Embedded cross compiling generally need the privilege of root user.
while the Ubuntu12.04 is not allow the to log in as a root, only permit the normal users and visitors to log in.

Solution:After logging in the Ubuntu as a normal user, we could make some modifications to make it support the root user.

After logging in as a normal user, commands should be executed in the terminal window to converse to the super user mode. And how to log in the terminal window in the Ubuntu12.04? Please refer to the introduction in the section of 6-4-1 Linux terminal.

Type in : sudo -s in the terminal window, press the"enter" button, and then type in the system password which was setup when installing Ubuntu 12.04, the root user privilege mode will be locked. Execute gedit /etc/lightdm/lightdm.conf in the terminal window.

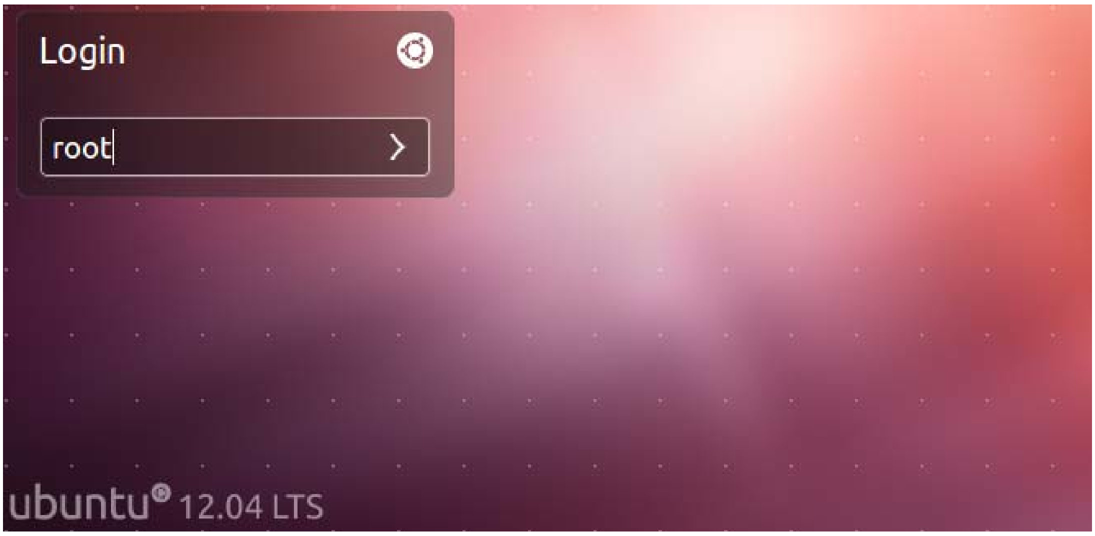
Add greeter-show-manual-login=true allow-guest=false.

The modified configuration file is as follows:

```
[SeatDefaults]
greeter-session=unity-greeter
user-session=ubuntu
greeter-show-manual-login=true # manually type in the username and password to login the system
allow-guest=false     #Guset is not allow to log in .
```

Start the root account and execute the passwd root command, type in the password.

Restart ubuntu, "log in "option will be found in the login window, and then we could log in as a root user.



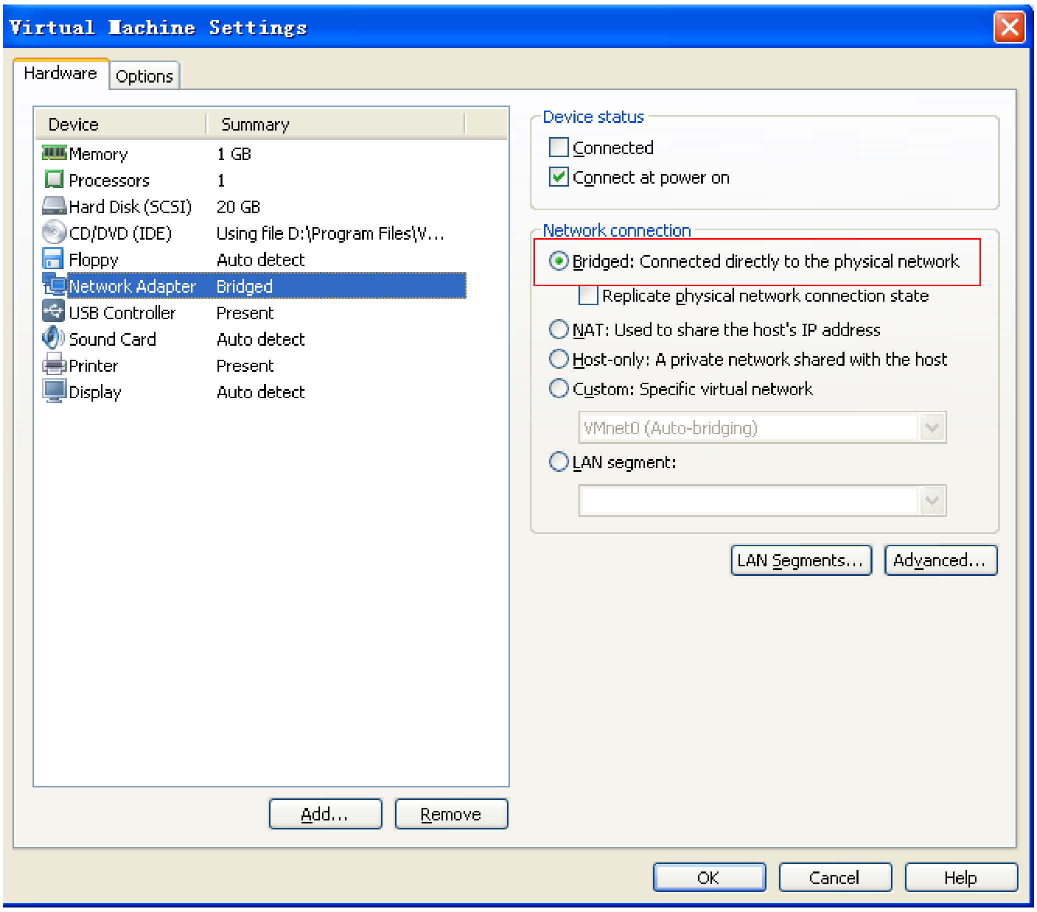
5-3 Setting of Ubuntu network parameters

The network environment of each PC may be different, you need to set up Ubuntu network according to your practical situation.if the setting is not successful, you could consult the official forum of Ubuntu.

In the following text, a setting method will be provided for your reference.

Step1.the virtual machine uses the fixed IP address.
After installation, the virtual machine will generally share one IP address with the host, which means it does not have its own IP address. Therefore, you need to setup the contact information of its network as the bridged connection.

Click the setting option in the VM menu, the VM setup dialogue box will be pop up. Please see the next picture:



Device	Summary
Memory	1 GB
Processors	1
Hard Disk (SCSI)	20 GB
CD/DVD (IDE)	Using file D:\Program Files\V...
Floppy	Auto detect
Network Adapter	Bridged
USB Controller	Present
Sound Card	Auto detect
Printer	Present
Display	Auto detect

Device status

□ Connected

☑ Connect at power on

Network connection

● Bridged: Connected directly to the physical network

□ Replicate physical network connection state

○ NAT: Used to share the host's IP address

○ Host-only: A private network shared with the host

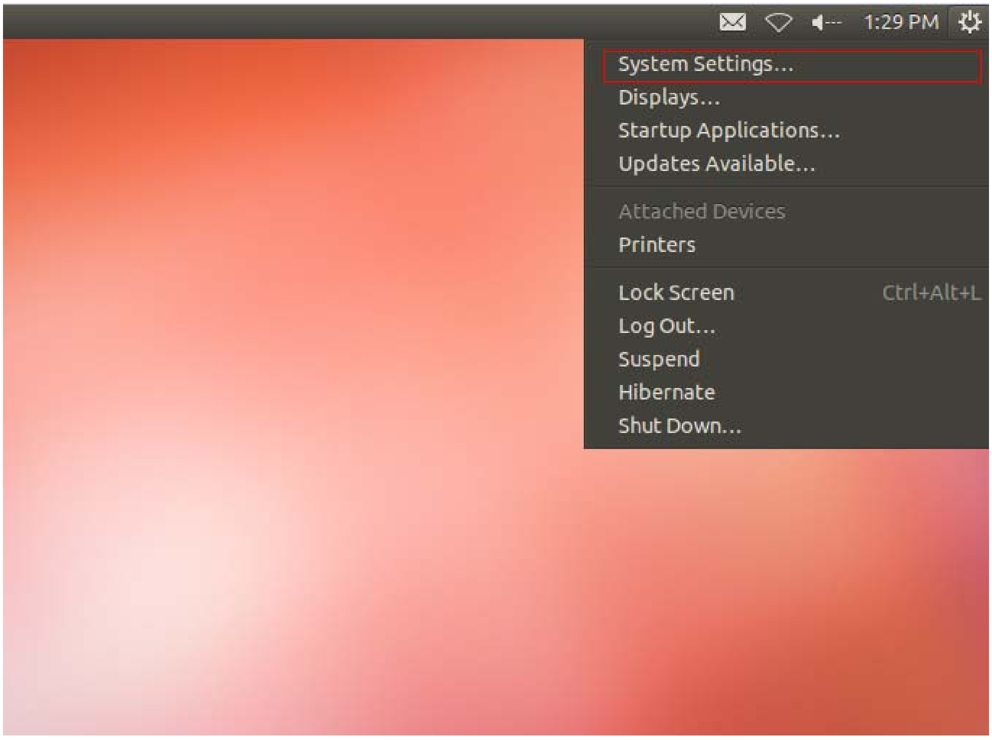
○ Custom: Specific virtual network

VMnet0 (Auto-bridging)

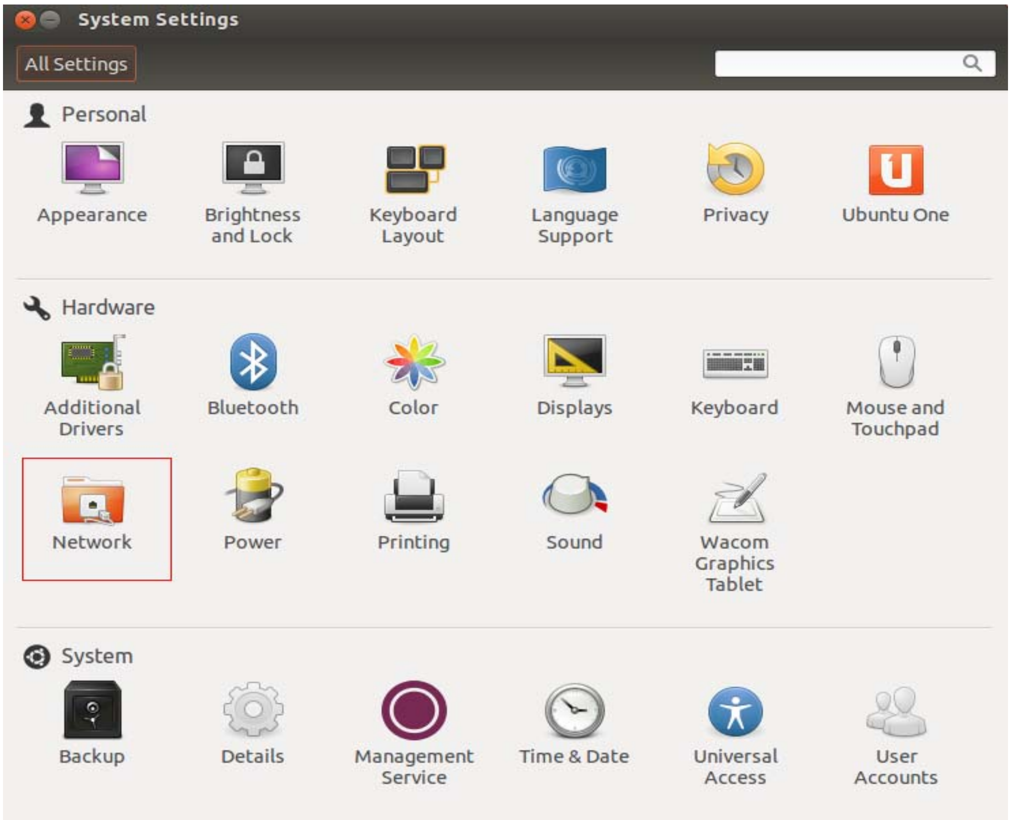
○ LAN segment:

Select the "Bridged", and click the "Ok" button.

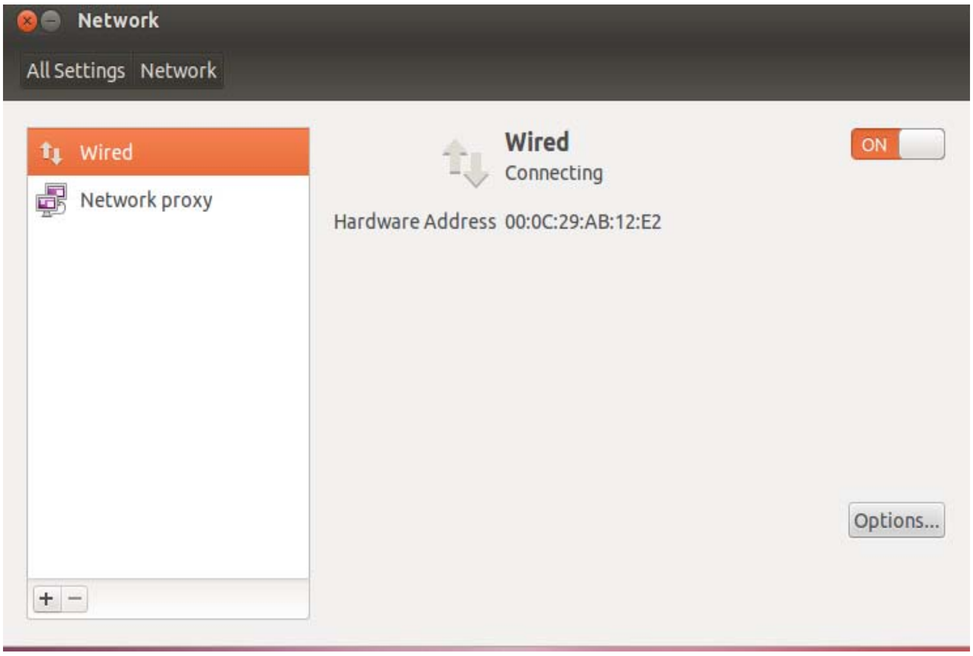
Step2. Start the Ubuntu, log in as a root user, click the button on the top right corner, options list will be pop up.



Select "System Setting".



Double click "network" icon:



Network

All Settings   Network

Wired

Network proxy

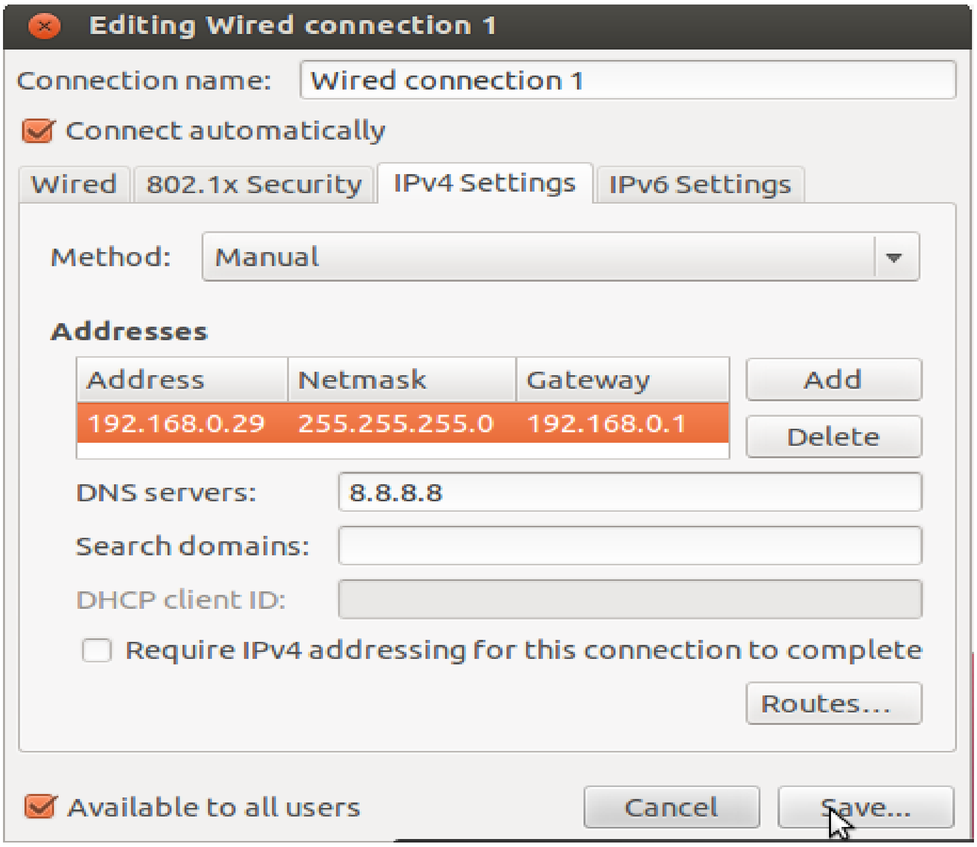
Wired
Connecting

ON

Hardware Address 00:0C:29:AB:12:E2

Options...

Click the "Option" button:



Editing Wired connection 1

Connection name: Wired connection 1

☑ Connect automatically

Wired | 802.1x Security | IPv4 Settings | IPv6 Settings

Method: Manual

Addresses

Address	Netmask	Gateway
192.168.0.29	255.255.255.0	192.168.0.1

Add
Delete

DNS servers: 8.8.8.8

Search domains:

DHCP client ID:

□ Require IPv4 addressing for this connection to complete

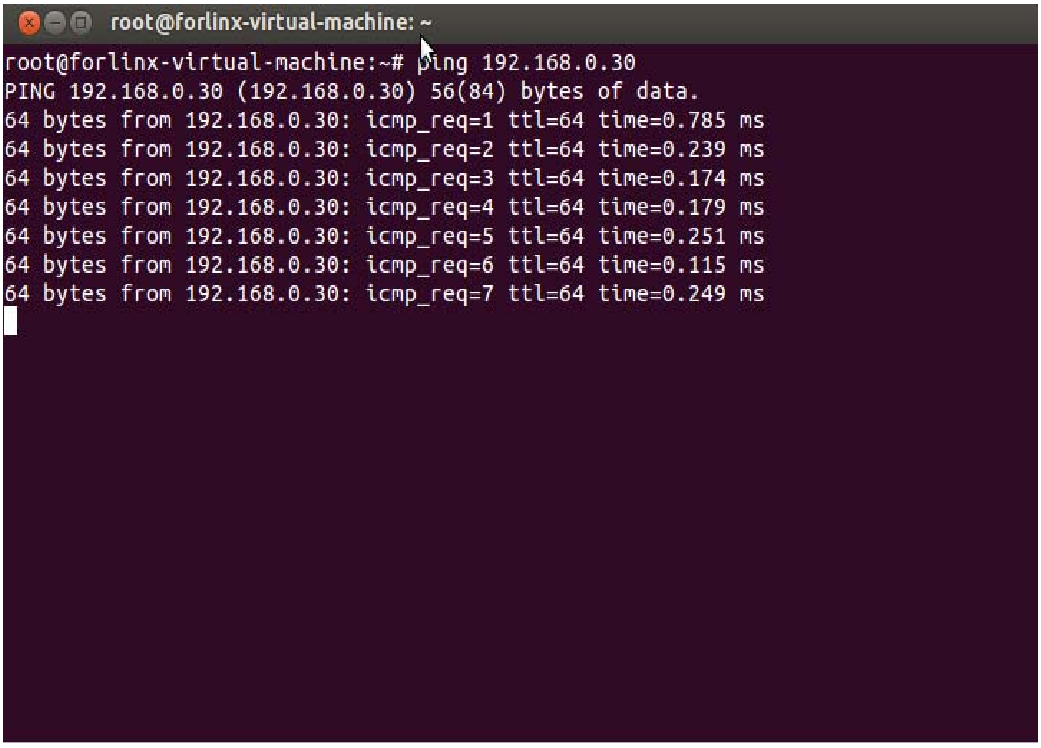
Routes…

☑ Available to all users

Cancel   Save...

Select the "IPV4 Setting",type in your IP address, subnet mask,gateway, DNS, finally save the setting, network setting will be completed.

Let's have a test, the host IP is 192.168.0.30,then ping the host through the virtual machine.

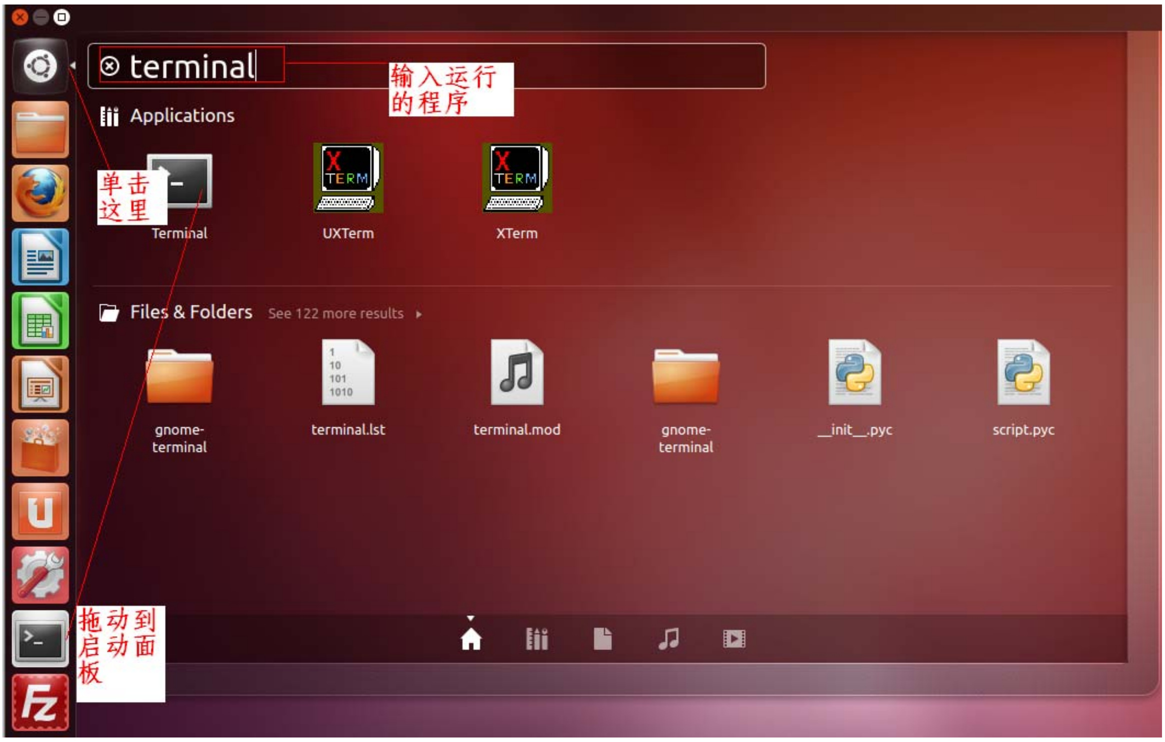


```
root@forlinx-virtual-machine:~# ping 192.168.0.30
PING 192.168.0.30 (192.168.0.30) 56(84) bytes of data.
64 bytes from 192.168.0.30: icmp_req=1 ttl=64 time=0.785 ms
64 bytes from 192.168.0.30: icmp_req=2 ttl=64 time=0.239 ms
64 bytes from 192.168.0.30: icmp_req=3 ttl=64 time=0.174 ms
64 bytes from 192.168.0.30: icmp_req=4 ttl=64 time=0.179 ms
64 bytes from 192.168.0.30: icmp_req=5 ttl=64 time=0.251 ms
64 bytes from 192.168.0.30: icmp_req=6 ttl=64 time=0.115 ms
64 bytes from 192.168.0.30: icmp_req=7 ttl=64 time=0.249 ms
```

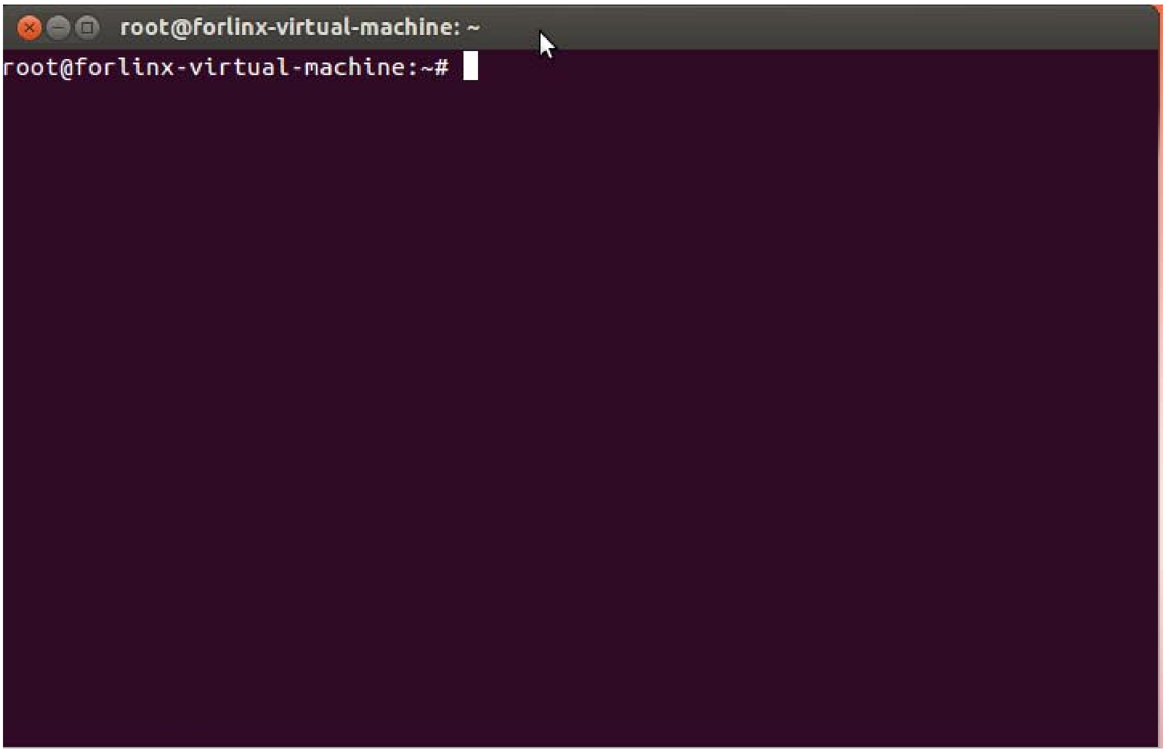
5-4 Commonly used application program of Ubuntu

5-4-1 Linux terminal

In the Linux system,Terminal is a kind of very practical window which is used to interact with the operation system.Terminal, could be used to compile the application program and boot system services, dominate the most important position in the Linux system.



Each time when you click the terminal icon on the panel, the terminal system will be started.



```
root@forlinx-virtual-machine:~#
```

5-5 Installation of cross compiler

Copy and paste arm-linux-gcc-4.3.2.tgz file to the directory of /forlinx of the Ubuntu. This file locates in the “utility”of the CD.Building a new terminal in the Ubuntu, input the following commands to install the cross compiler:

```
#cd     /forlinx
```

Enter into /forlinx directory

```
#mkdir     /usr/local/arm
```

Build a directory, skip in case of a existing directory

```
#tar     zxvf     arm-linux-gcc-4.3.2.tgz     -C     /
```

decompress compiler to /usr/local/arm

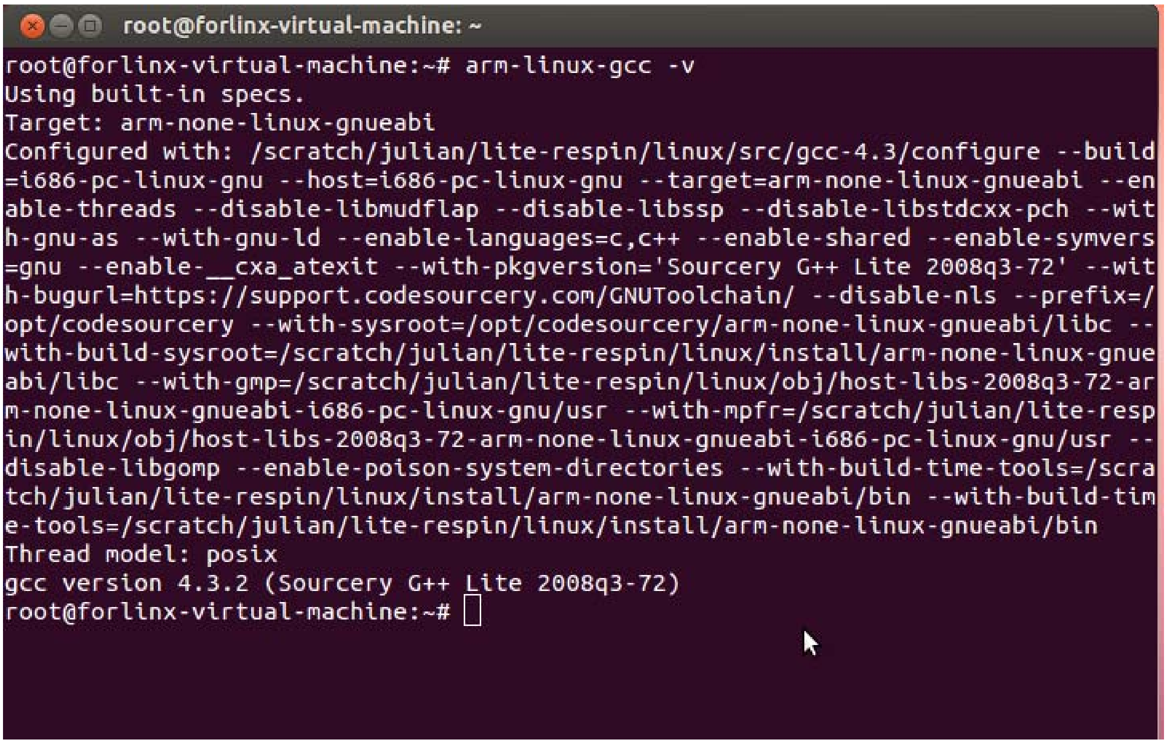
Add the cross compiler path into the system environment variables,and then the arm-linx-gcc command could be directly typed in to the terminal window to compile the program.

Execute in the terminal:gedit /etc/profile

Add the following four lines in the file:

```
export PATH=/usr/local/arm/4.3.2/bin:$PATH
export TOOLCHAIN=/usr/local/arm/4.3.2
export TB_CC_PREFIX=arm-linux-
export PKG_CONFIG_PREFIX=$TOOLCHAIN/arm-none-linux-gnueabi
```

Save, exit.
Restart the system. Execute arm-linux-gcc in the terminal and press the "Enter"button.



```
root@forlinx-virtual-machine:~# arm-linux-gcc -v
Using built-in specs.
Target: arm-none-linux-gnueabi
Configured with: /scratch/julian/lite-respin/linux/src/gcc-4.3/configure --build
=i686-pc-linux-gnu --host=i686-pc-linux-gnu --target=arm-none-linux-gnueabi --en
able-threads --disable-libmudflap --disable-libssp --disable-libstdcxx-pch --wit
h-gnu-as --with-gnu-ld --enable-languages=c,c++ --enable-shared --enable-symvers
=gnu --enable-__cxa_atexit --with-pkgversion='Sourcery G++ Lite 2008q3-72' --wit
h-bugurl=https://support.codesourcery.com/GNUToolchain/ --disable-nls --prefix=/
opt/codesourcery --with-sysroot=/opt/codesourcery/arm-none-linux-gnueabi/libc --
with-build-sysroot=/scratch/julian/lite-respin/linux/install/arm-none-linux-gnue
abi/libc --with-gmp=/scratch/julian/lite-respin/linux/obj/host-libs-2008q3-72-ar
m-none-linux-gnueabi-i686-pc-linux-gnu/usr --with-mpfr=/scratch/julian/lite-resp
in/linux/obj/host-libs-2008q3-72-arm-none-linux-gnueabi-i686-pc-linux-gnu/usr --
disable-libgomp --enable-poison-system-directories --with-build-time-tools=/scra
tch/julian/lite-respin/linux/install/arm-none-linux-gnueabi/bin --with-build-tim
e-tools=/scratch/julian/lite-respin/linux/install/arm-none-linux-gnueabi/bin
Thread model: posix
gcc version 4.3.2 (Sourcery G++ Lite 2008q3-72)
root@forlinx-virtual-machine:~# 
```

It shows that the cross compiler has been successfully installed into the system, the compiler also could be used to compile Uboot code and kernel code.

Chapter 6. Compile kernels of UBOOT and Linux

This chapter tells you how to compile the Uboot and Linux kernel on PC Linux. Before operating tests in this chapter, please read chapter 5 establishment of development environment for reference.

Note: In this chapter, if there were no special instructions, all executable commands and setting environments are all in conformity with the Linux of PC. Adding '#'at the beginning of each command to indicate the start of each command.

File name	Paths in the CD
uboot1.1.6_FORLINX_6410.tgz (uboot source code compressed package)	Linux-3.0.1\uboot_sourcedode\
FORLINX_linux-3.0.1.tar.gz (Linux-3.0.1source code compressed package)	Linux-3.0.1\kernel_sourcecode\

6-1 Compile u-boot-1.1.6

Copy and paste the uboot source code compressed package ‘uboot1.1.6_FORLINX_6410.tgz’into the forlinx directory of Ubuntu, decompress and compile it. The operation procedures under Ubuntu are as follows:

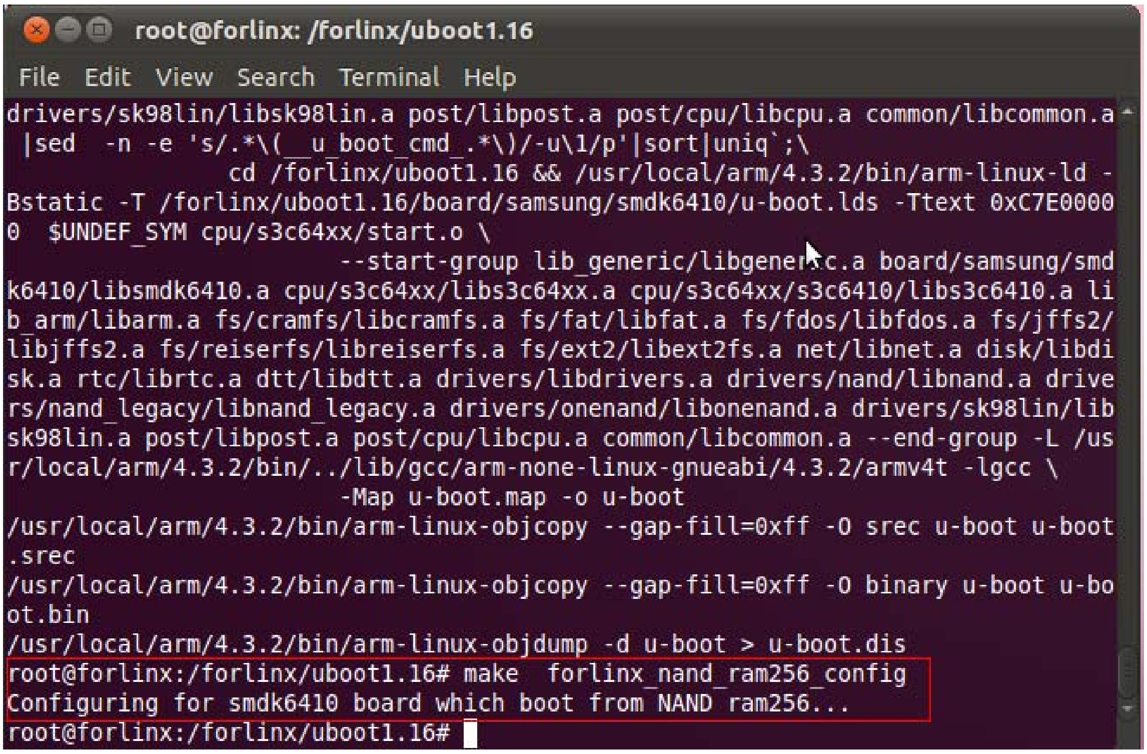
#tar zxf uboot1.1.6_FORLINX_6410.tgz (decompress uboot source code)

6-1-1 Compiling method of Uboot in 256M development board

Enter into uboot1.1.6 directory, configurate config, compile:

#cd uboot1.1.6 （Enter into the uboot source code directory）

# make forlinx_nand_ram256_config （Configurate config which is suitable for board with 256M memory）

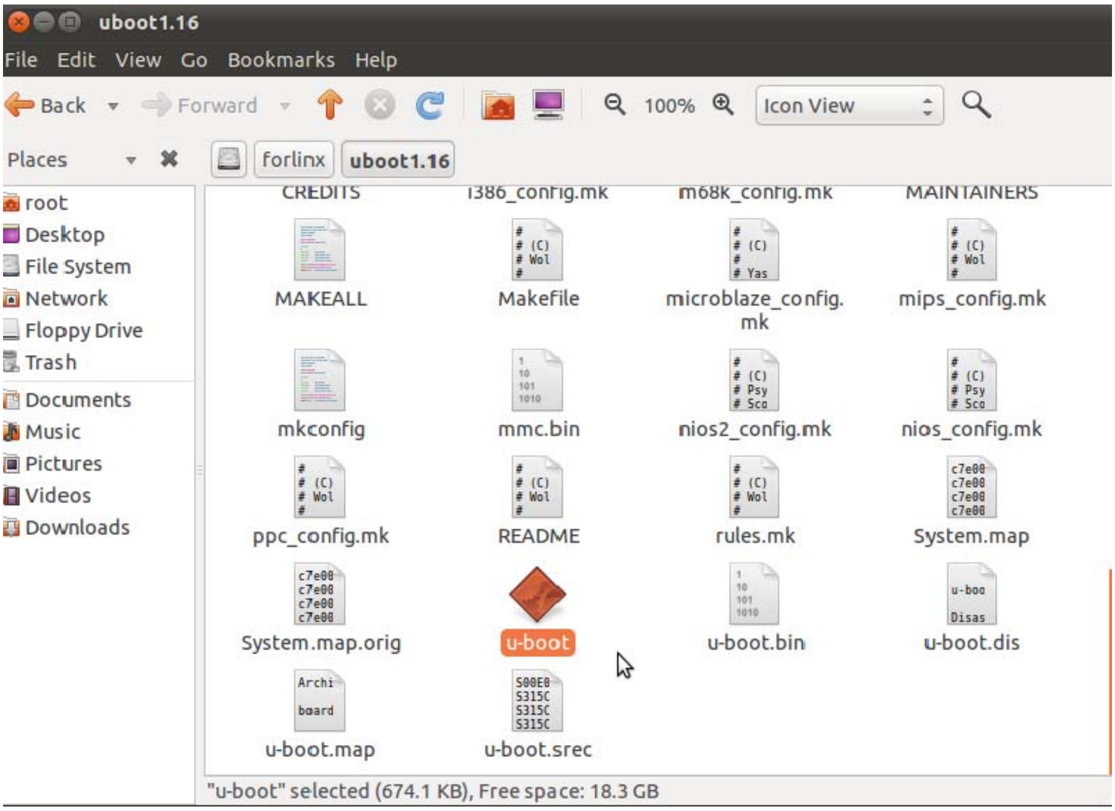


```
drivers/sk98lin/libsk98lin.a post/libpost.a post/cpu/libcpu.a common/libcommon.a
 |sed  -n -e 's/.*\(__u_boot_cmd_.*\)/-u\1/p'|sort|uniq`;\
                cd /forlinx/uboot1.16 && /usr/local/arm/4.3.2/bin/arm-linux-ld -
Bstatic -T /forlinx/uboot1.16/board/samsung/smdk6410/u-boot.lds -Ttext 0xC7E0000
0  $UNDEF_SYM cpu/s3c64xx/start.o \
                        --start-group lib_generic/libgeneric.a board/samsung/smd
k6410/libsmdk6410.a cpu/s3c64xx/libs3c64xx.a cpu/s3c64xx/s3c6410/libs3c6410.a li
b_arm/libarm.a fs/cramfs/libcramfs.a fs/fat/libfat.a fs/fdos/libfdos.a fs/jffs2/
libjffs2.a fs/reiserfs/libreiserfs.a fs/ext2/libext2fs.a net/libnet.a disk/libdi
sk.a rtc/librtc.a dtt/libdtt.a drivers/libdrivers.a drivers/nand/libnand.a drive
rs/nand_legacy/libnand_legacy.a drivers/onenand/libonenand.a drivers/sk98lin/lib
sk98lin.a post/libpost.a post/cpu/libcpu.a common/libcommon.a --end-group -L /us
r/local/arm/4.3.2/bin/../lib/gcc/arm-none-linux-gnueabi/4.3.2/armv4t -lgcc \
                        -Map u-boot.map -o u-boot
/usr/local/arm/4.3.2/bin/arm-linux-objcopy --gap-fill=0xff -O srec u-boot u-boot
.srec
/usr/local/arm/4.3.2/bin/arm-linux-objcopy --gap-fill=0xff -O binary u-boot u-bo
ot.bin
/usr/local/arm/4.3.2/bin/arm-linux-objdump -d u-boot > u-boot.dis
root@forlinx:/forlinx/uboot1.16# make  forlinx_nand_ram256_config
Configuring for smdk6410 board which boot from NAND ram256...
root@forlinx:/forlinx/uboot1.16# 
```

#make clean （Delete files compiled before）

#make （Compile）

When the compiling is finished,there will be a binary file named as‘u-boot.bin’which is generated under the directory of ‘uboot1.1.6’.The u-boot.bin file is the U-boot image file which need to be infused into the Nandflash.



"u-boot" selected (674.1 KB), Free space: 18.3 GB

6-2 Compile Linux-3.0.1

Copy and paste the compressed package ‘FORLINX_linux-3.0.1.tar.gz’to your working directory, decompress it:

```
#tar   zxf   FORLINX_linux-3.0.1.tar.gz
```

6-2-1 Kernel configuration

You may need to install ‘libncurses5’ to execute ‘make menuconfig’command. installation could be done by using the following commands(This step requires the connection between PC and internet):

```
#sudo   apt-get   install   libncurses5-dev
```

If the installation package libncurses5-dev could not be found after executing commands, and then you need to execute #sudo apt-get update in advance.

6-2-2 Kernel compiling

Command is: #make zImage.

After compiling, a Linux kernel image file could be found in the arch/arm/boot.

6-2-3 Source code path of development board driver

(1)DM9000 net card driver

drivers/net/dm9000.c

(2)Serial port (it contains three serial port driver 0,1,2,4，corresponding device name is /dev/ttySAC0,1,2,4)

drivers/tty/serial/s3c6400.c

(4)LED driver

drivers/char/s3c6410_leds.c

(5)Watchdog driver

drivers/watchdog/s3c2410_wdt.c

(6)Touch screen driver

drivers/input/touchscreen/s3c-ts.c

(7)yaffs2 file system source code directory

fs/yaffs2

(9)SD/MMC card driver source code directory

drivers/mmc

(10)Nandflash driver

drivers/mtd/nand

(11)Directory of WM9714 audio driver

sound/soc/s3c24xx/smdk_wm9713.c

sound/soc/s3c24xx/s3c-ac97.c

(12)LCD driver

drivers/video/samsung

(13)U-disk support driver

drivers/usb/storage

(14)USB mouse,　keyboard source code

drivers/hid

(15)CMOS camera driver

drivers/media/video/samsung/fimc

(16)USB wireless net card driver

drivers/net/wireless/rt2x00

(17)USB to serial port driver

drivers/usb/serial/pl2302.c

(18)SDIO WIFI wireless net card driver

drivers/net/wireless/libertas

(19)CPU TV output driver

drivers/media/video/samsung/tv

(20)Matrix keyboard Hardware controller driver, specially used with Forlinx 6410

drivers/input/keyboard

(21)ADC driver

drivers/char/adc.c

(22)PWM buzzer driver

drivers/char/forlinx6410_pwm.c

(23)HS0038B infrared driver
drivers/char/forlinx6410_irda.c
(24)Temperature sensor DS18B20
drivers/char/forlinx6410_18b20.c

Chapter7 Image making of the yaffs2 file system

7-1 Well-prepared file system

We will take the Forlinx file system which is provided by Forlinx as a example, teach you how to make the image of yaffs2 file system through demonstration.

FileSystem-Yaffs2.tar.gz is the directory of the file system we provided, could be used by users to make Yaffs2 file system, could also be used to mount the NFS network root file. Details of NFS mount could refer to 4-7-7 Mount NFS network file system

Note: FileSystem-Yaffs2.tar.gz published this time was added some useful qtopia2.2.0 test programs,and was abridged some qt4.7.1 demonstration programs.

7-2 Image making

there are two making tools in the CD\Linux-3.0.1.1\filesystem\Yaffs2file system, they are respectively mkyaffs2image-nand2g and mkyaffs2image-nand256m

（1）

Images made by mkyaffs2image-nand256m are suitable for the board with256M and 1G byte.

Command: #./mkyaffs2image-nand256m   FileSystem-Yaffs2   rootfs.yaffs2

（2）

Images made by mkyaffs2image-nand2g are suitable for the board with 2G byte nandflash.

Command: #./mkyaffs2image-nand2g   FileSystem-Yaffs2   rootfs.yaffs2.

At last rootfs.yaffs2 is generated, which is the image of yaffs2 file system,could be downloaded to the nandflash in the board.

Chapter8 Coding and decoding test of multimedia hardware

8-1 Multimedia Function introduction

Multimedia codec (MFC)internally integrated in the S3C6410 could support coding and decoding of the MPEG4/H.263/H.264,decoding of VC1,decoding performance reaches 720x480 30fps or 720x576 25fps.

AVI coded by H.264 and MP4 coded by MPEG4 could play well in the s3c6410 chip. The resolution of these audio and video files usually are less than or equal to 720*480.if the resolution is greater than it, conversion tools need to be used to converse file format to a format supported by 6410, conversion methods will be introduced in the following chapters.

In addition, multimedia test program could also test the preview function of OV9650 camera, coding function of video data H.264, datas conversion function from YUV420,YUV422 to RGB.it could be regarded as the firsthand materials for learning video coding and decoding.

The kernel source code of Linux provided by us contain coding and decoding driver of 6410 multimedia hardware and ov9650 camera driver, which is totally open source for users. We put it in the kernel of Linux3.0 for convenience during the users'study and development process.

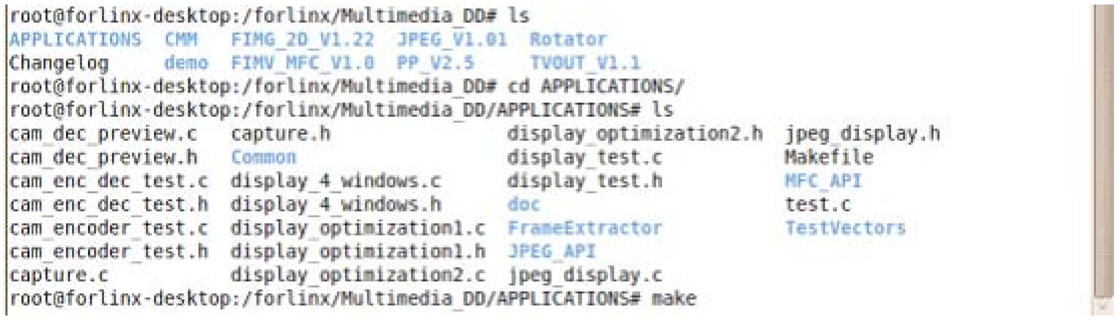
8-2 Multimedia integration testing 1

Multimedia test program-multimediatest provided by Samsung could test decoding of MPEG4， H.264,H.263 ,coding of H.264, coding and decoding of JPEG. We have made some modification on Samsung version. Our products could support screens of 3.5-inch, 4.3-inch，5.6-inch，7-inch，8-inch，10.4-inch and VGA, HDMI output display. source codes are provided in the CD.

8-2-1 Compile Multimedia Test program

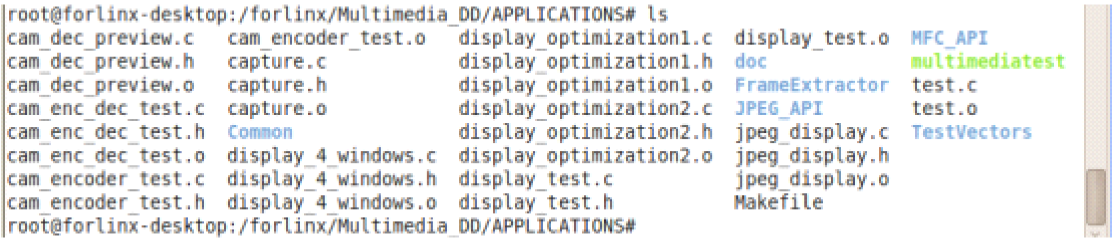
Integration test program of multimedia hardware coding and decoding locates in the directory of "Linux3.0\apptest\Multimedia"in the CD. Copy and paste it to the directory of /forlinx of Ubuntu, decompress it , and a Multimedia_DD directory will be generated.

Compile mutilmediatest program



```
root@forlinx-desktop:/forlinx/Multimedia_DD# ls
APPLICATIONS  CMM   FIMG_2D_V1.22  JPEG_V1.01  Rotator
Changelog     demo  FIMV_MFC_V1.0  PP_V2.5     TVOUT_V1.1
root@forlinx-desktop:/forlinx/Multimedia_DD# cd APPLICATIONS/
root@forlinx-desktop:/forlinx/Multimedia_DD/APPLICATIONS# ls
cam_dec_preview.c   capture.h              display_optimization2.h  jpeg_display.h
cam_dec_preview.h   Common                 display_test.c           Makefile
cam_enc_dec_test.c  display_4_windows.c    display_test.h           MFC_API
cam_enc_dec_test.h  display_4_windows.h    doc                      test.c
cam_encoder_test.c  display_optimization1.c  FrameExtractor         TestVectors
cam_encoder_test.h  display_optimization1.h  JPEG_API
capture.c           display_optimization2.c  jpeg_display.c
root@forlinx-desktop:/forlinx/Multimedia_DD/APPLICATIONS# make
```

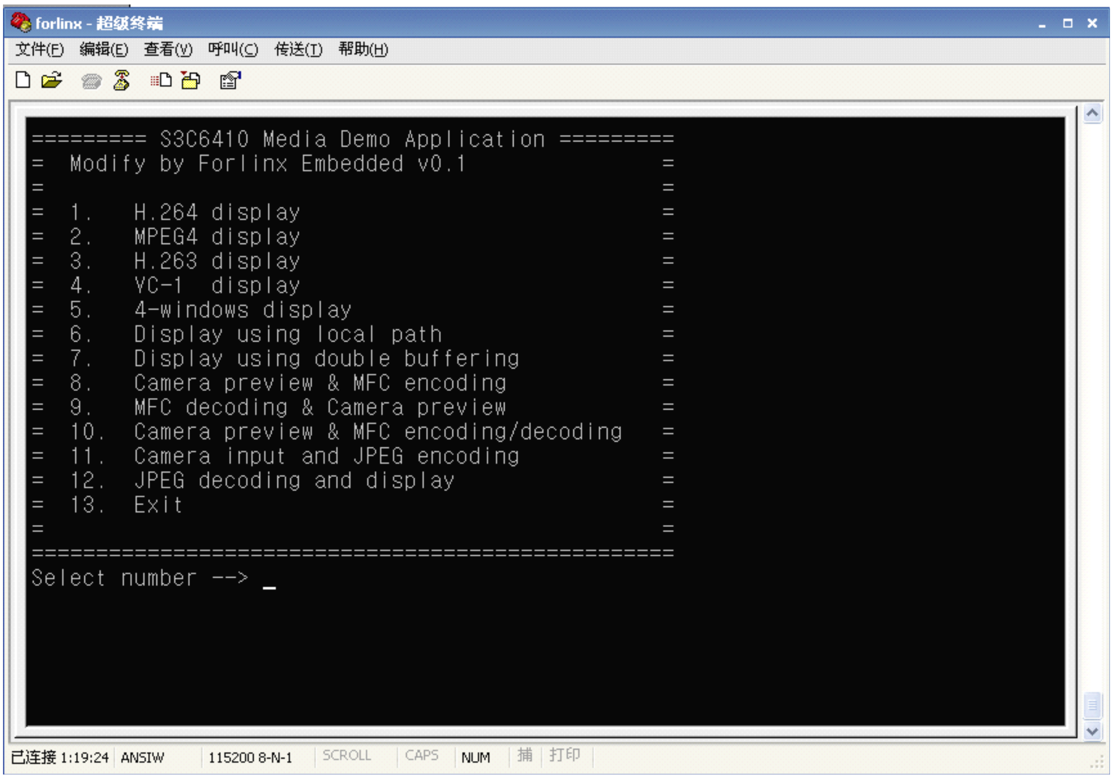
Enter into the directory of /forlinx/Multimedia_DD/APPLICATIONS, execute #make to start compiling. After compiling is over, a multimediatest program will be generated.



```
root@forlinx-desktop:/forlinx/Multimedia_DD/APPLICATIONS# ls
cam_dec_preview.c   cam_encoder_test.o   display_optimization1.c  display_test.o  MFC_API
cam_dec_preview.h   capture.c            display_optimization1.h  doc             multimediatest
cam_dec_preview.o   capture.h            display_optimization1.o  FrameExtractor  test.c
cam_enc_dec_test.c  capture.o            display_optimization2.c  JPEG_API        test.o
cam_enc_dec_test.h  Common               display_optimization2.h  jpeg_display.c  TestVectors
cam_enc_dec_test.o  display_4_windows.c  display_optimization2.o  jpeg_display.h
cam_encoder_test.c  display_4_windows.h  display_test.c           jpeg_display.o
cam_encoder_test.h  display_4_windows.o  display_test.h           Makefile
root@forlinx-desktop:/forlinx/Multimedia_DD/APPLICATIONS#
```

Furthermore, our file system have contained a multimediatest program, you need to copy and paste self-compiled multimediatest or multimediatest under /usr/bin/ of our file system into the SD card and conduct the running of it. You still need a multimedia test folder TestVectors which locates under CD\Linux3.0\apptest\Multimedia.

(1) Copy and paste multimediatest program and TestVectors file folder into SD card
(2) Insert SD card into the board, start the system
(3) Enter into the directory of SD card: #cd /sdcard
(4)Run the test program: #./multimediatest.

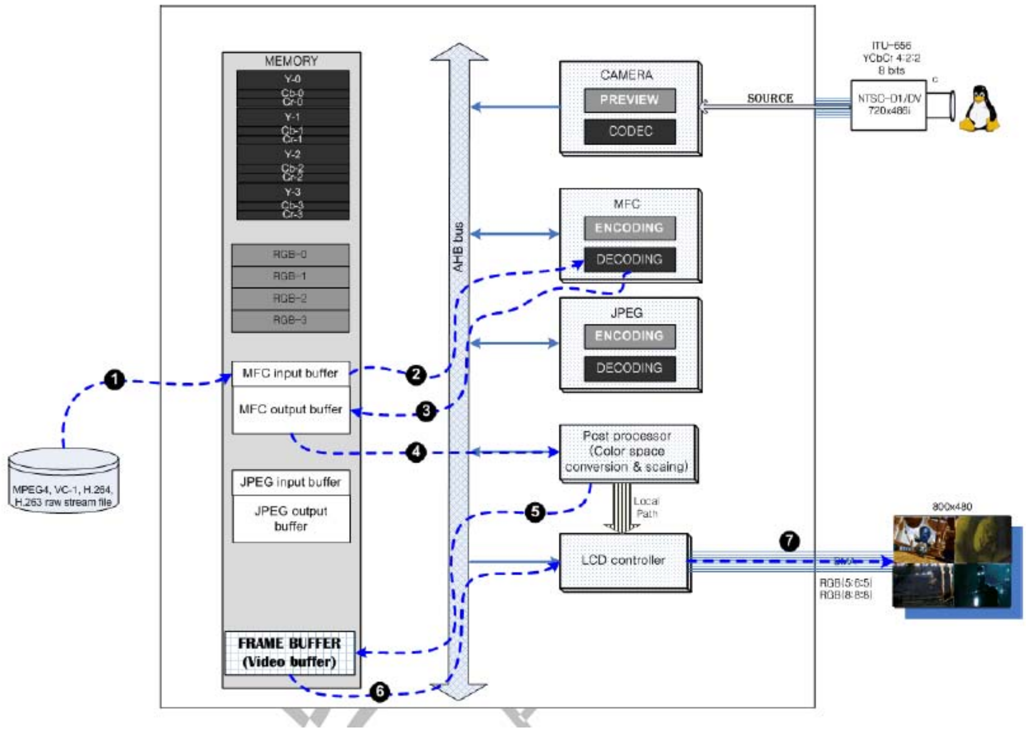


```
========= S3C6410 Media Demo Application =========
=  Modify by Forlinx Embedded v0.1               =
=                                                =
=  1.   H.264 display                            =
=  2.   MPEG4 display                            =
=  3.   H.263 display                            =
=  4.   VC-1  display                            =
=  5.   4-windows display                        =
=  6.   Display using local path                 =
=  7.   Display using double buffering           =
=  8.   Camera preview & MFC encoding            =
=  9.   MFC decoding & Camera preview            =
=  10.  Camera preview & MFC encoding/decoding   =
=  11.  Camera input and JPEG encoding           =
=  12.  JPEG decoding and display                =
=  13.  Exit                                     =
=                                                =
==================================================
Select number --> _
```

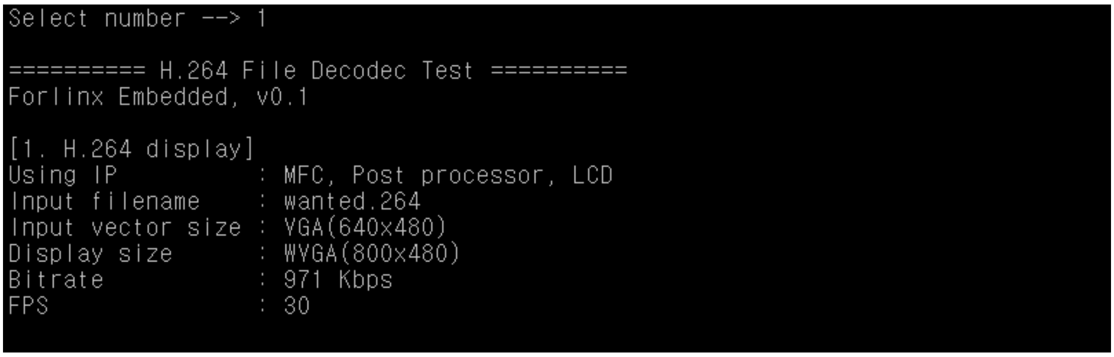
Note: the sixth item" Display using local path" only support 24 color display fomat. Our board is RGB565 mode which supports 16 color. we will not introduce it any more.

8-2-2 H.624 decoding

In the main menu of test program,1- 5 are regarded as video decoding test, the flow chart is as follows:



Type ‘1’ to start the H.264 video decoding test.


```
Select number --> 1

========== H.264 File Decodec Test ==========
Forlinx Embedded, v0.1

[1. H.264 display]
Using IP          : MFC, Post processor, LCD
Input filename    : wanted.264
Input vector size : VGA(640x480)
Display size      : WVGA(800x480)
Bitrate           : 971 Kbps
FPS               : 30
```

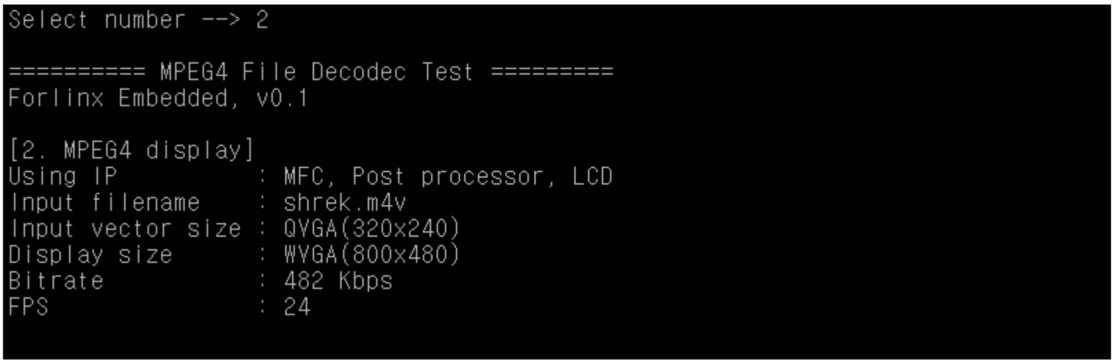
Play effect:

SW1
SW2
SW3
SW4

SW1
SW2
SW3
SW4

8-2-3 MPEG4 decoding

Type ‘2 ‘to start the MPEG4 video decoding test.

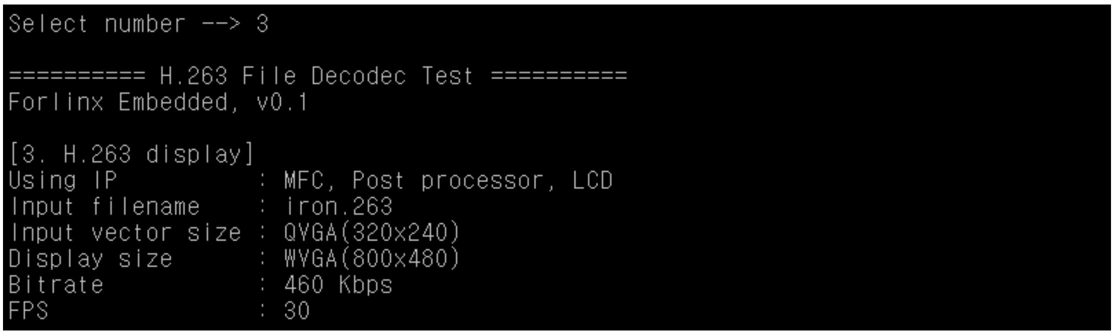


```
Select number --> 2

========== MPEG4 File Decodec Test =========
Forlinx Embedded, v0.1

[2. MPEG4 display]
Using IP          : MFC, Post processor, LCD
Input filename    : shrek.m4v
Input vector size : QVGA(320x240)
Display size      : WVGA(800x480)
Bitrate           : 482 Kbps
FPS               : 24
```

Play effect:

8-2-4 H.263 decoding

Type ‘3 ‘to start the H.263 video decoding test.

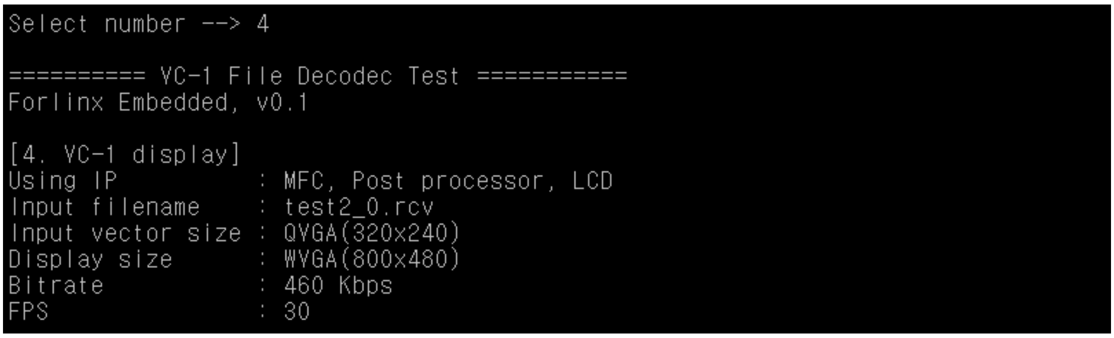


```
Select number --> 3

========== H.263 File Decodec Test ==========
Forlinx Embedded, v0.1

[3. H.263 display]
Using IP          : MFC, Post processor, LCD
Input filename    : iron.263
Input vector size : QVGA(320x240)
Display size      : WVGA(800x480)
Bitrate           : 460 Kbps
FPS               : 30
```

Play effect:

8-2-5 VC-1 decoding

Type ‘4 ‘to start the VC-1 video decoding test.

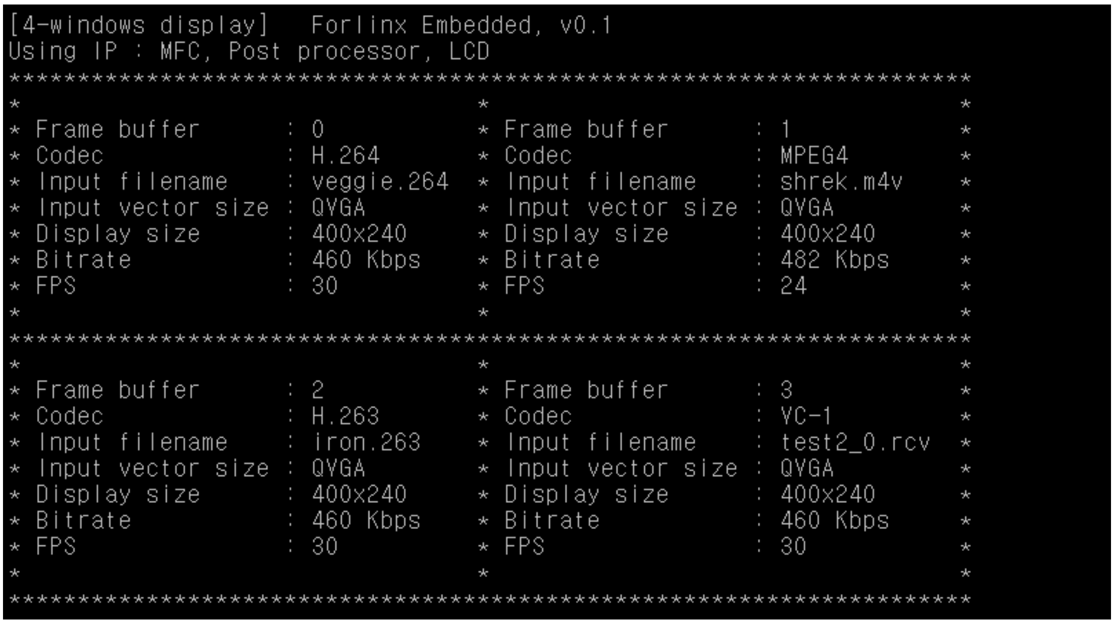


```
Select number --> 4

========== VC-1 File Decodec Test ===========
Forlinx Embedded, v0.1

[4. VC-1 display]
Using IP           : MFC, Post processor, LCD
Input filename     : test2_0.rcv
Input vector size  : QVGA(320x240)
Display size       : WVGA(800x480)
Bitrate            : 460 Kbps
FPS                : 30
```

Play effect:

8-2-6 simultaneous decoding of various videos

Type ‘5 ‘to start the simultaneous decoding tests of videos with multiple formats.

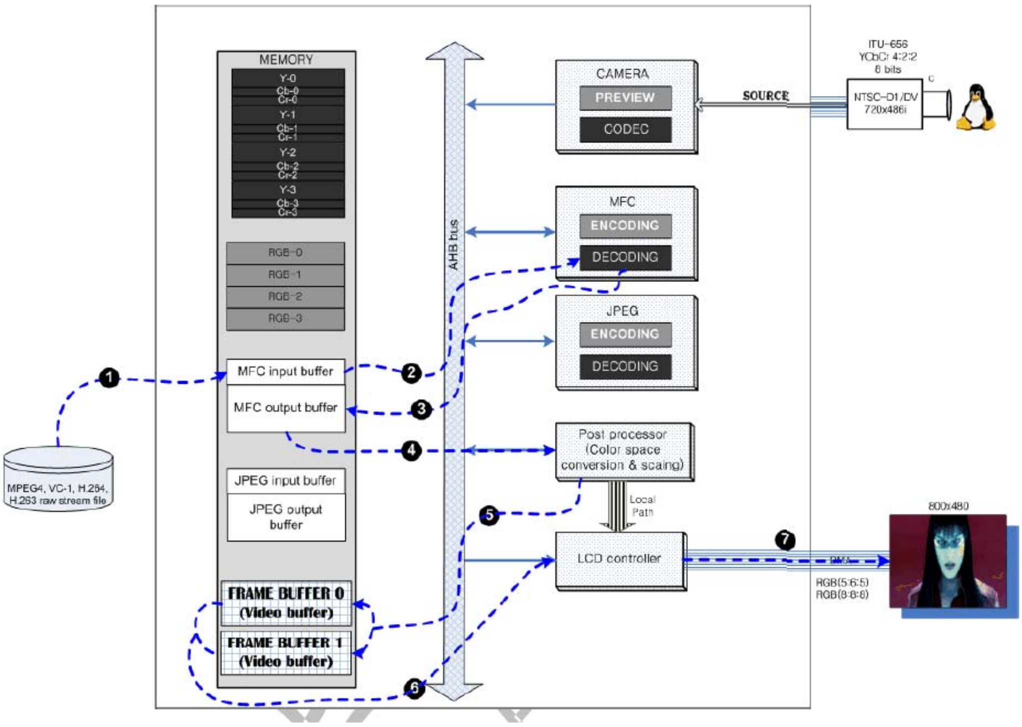


```
[4-windows display]   Forlinx Embedded, v0.1
Using IP : MFC, Post processor, LCD
***********************************************************************
*                                  *                                  *
* Frame buffer       : 0           * Frame buffer       : 1           *
* Codec              : H.264       * Codec              : MPEG4       *
* Input filename     : veggie.264  * Input filename     : shrek.m4v   *
* Input vector size  : QVGA        * Input vector size  : QVGA        *
* Display size       : 400x240     * Display size       : 400x240     *
* Bitrate            : 460 Kbps    * Bitrate            : 482 Kbps    *
* FPS                : 30          * FPS                : 24          *
*                                  *                                  *
***********************************************************************
*                                  *                                  *
* Frame buffer       : 2           * Frame buffer       : 3           *
* Codec              : H.263       * Codec              : VC-1        *
* Input filename     : iron.263    * Input filename     : test2_0.rcv *
* Input vector size  : QVGA        * Input vector size  : QVGA        *
* Display size       : 400x240     * Display size       : 400x240     *
* Bitrate            : 460 Kbps    * Bitrate            : 460 Kbps    *
* FPS                : 30          * FPS                : 30          *
*                                  *                                  *
***********************************************************************
```

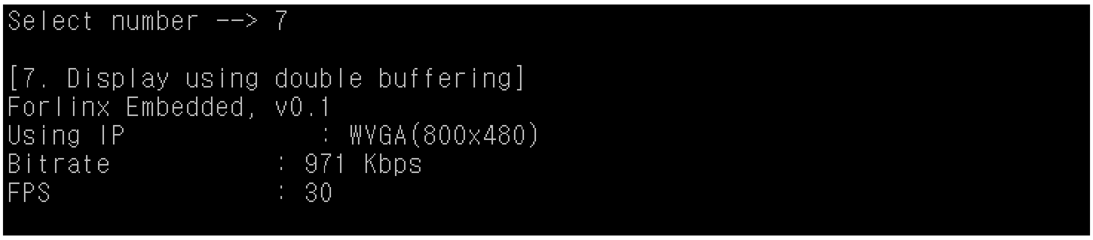
Play effects:

8-2-7 H.264 decoding &LCD double buffering

This program mainly test double video buffering, the flow chart is as follows:



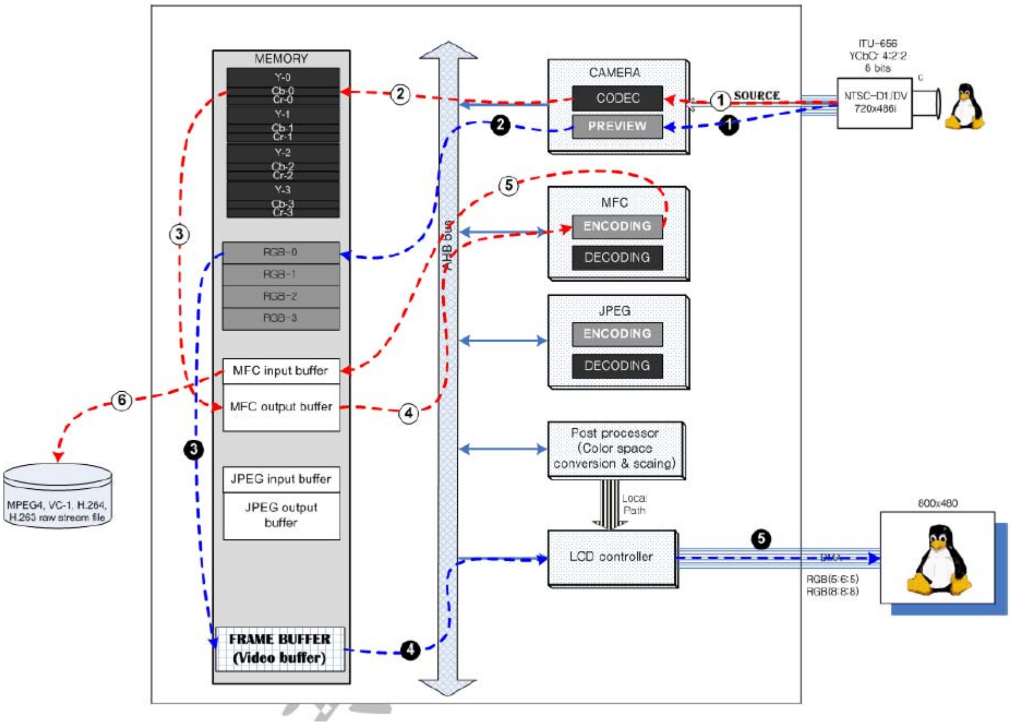
Type in “7” to begin the test, the play effect is like what the chaper4-1 displays



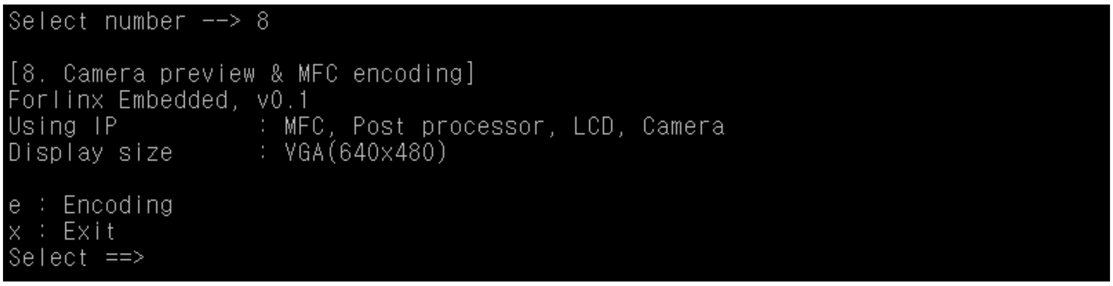
```
Select number --> 7

[7. Display using double buffering]
Forlinx Embedded, v0.1
Using IP              : WVGA(800x480)
Bitrate             : 971 Kbps
FPS                 : 30
```

8-2-8 Camera preview& MFC coding

This program conducts preview function of camera and compression of current frame;the blue line in next picture stands for the preview procedure, red line is responsible for the coding of present codec channel data. These two parts operate respectively in different threads.



Input “8” to begin the test.

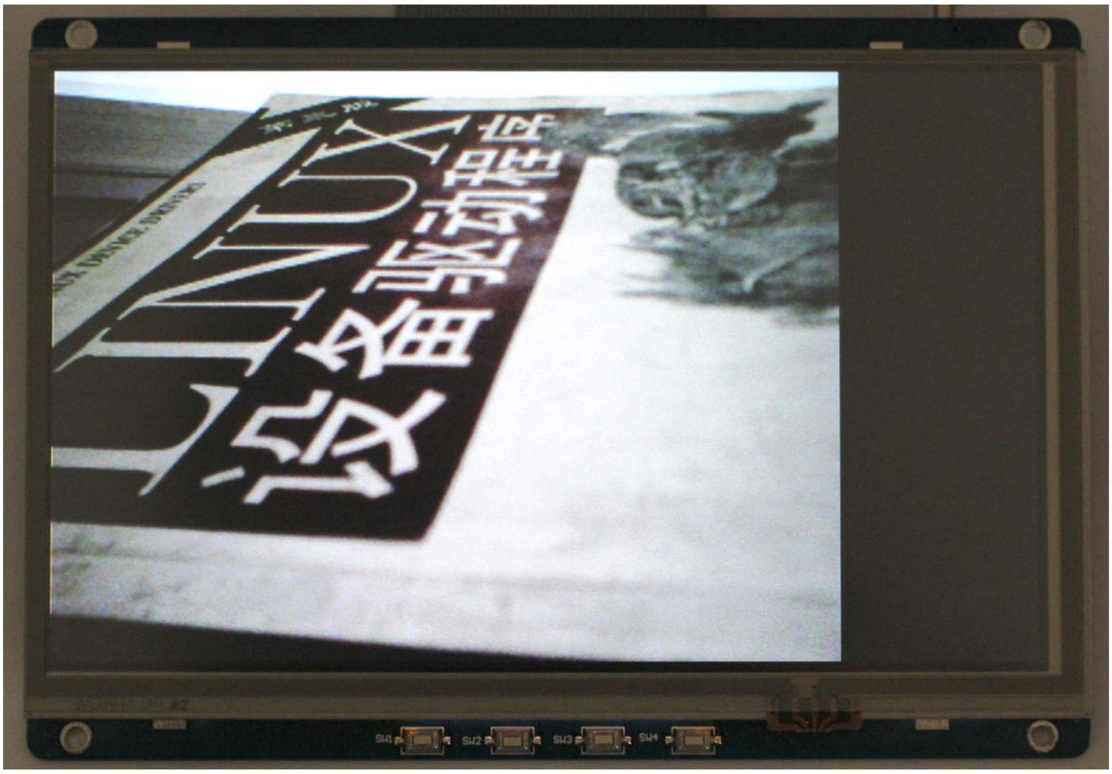


```
Select number --> 8

[8. Camera preview & MFC encoding]
Forlinx Embedded, v0.1
Using IP          : MFC, Post processor, LCD, Camera
Display size      : VGA(640x480)

e : Encoding
x : Exit
Select ==>
```

Input “e” and begin coding. Its length reaches 100 frame.

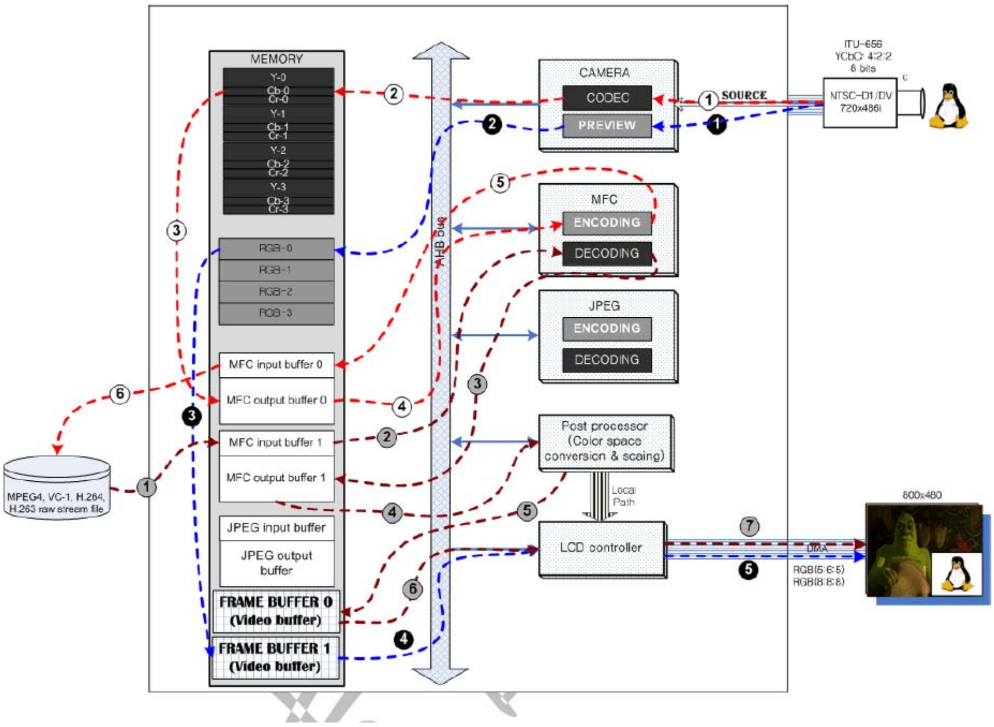
Input “x” to quit

Sampling effect of camera:

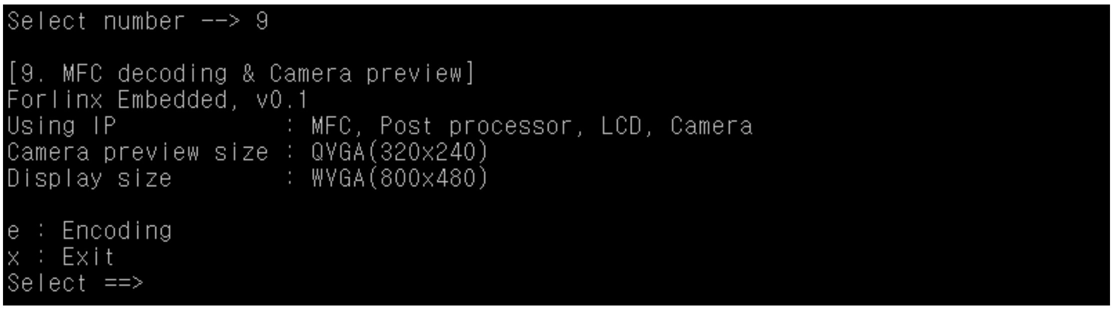


8-2-9 H.264 decoding& camera preview

This program simultaneously operate H.264 decoding and camera preview , and it also could execute the decoding of present frame.



Input 9" to begin the test.

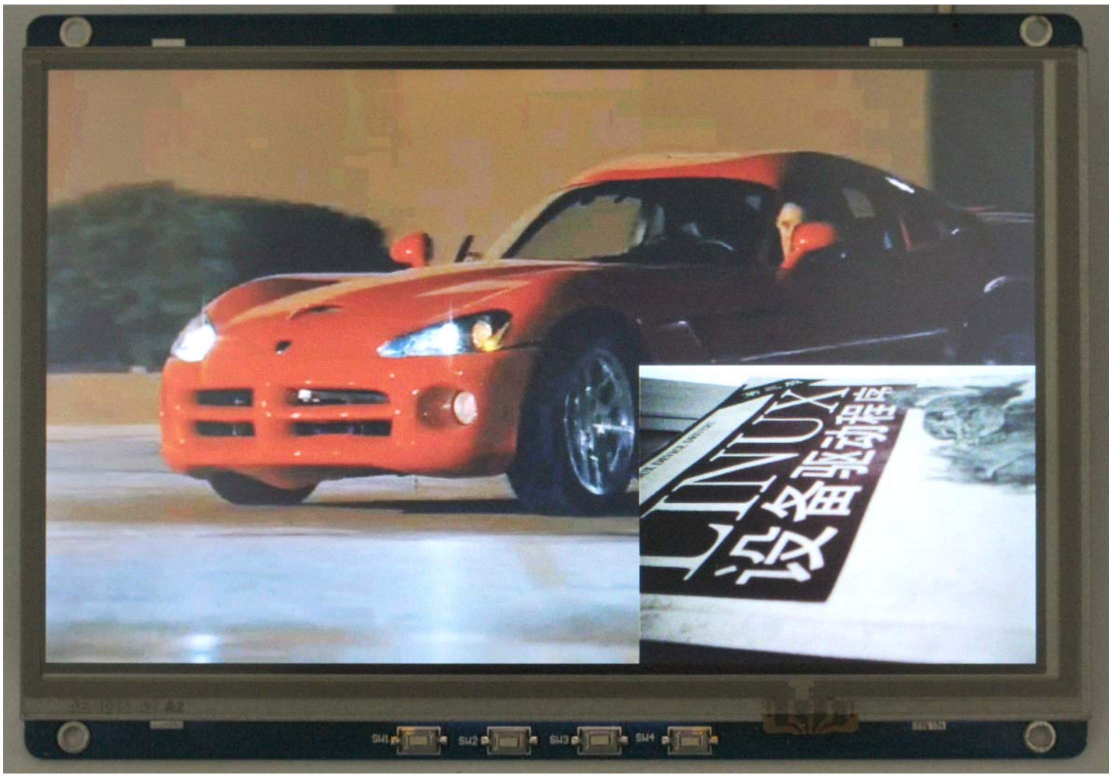


```
Select number --> 9

[9. MFC decoding & Camera preview]
Forlinx Embedded, v0.1
Using IP             : MFC, Post processor, LCD, Camera
Camera preview size : QVGA(320x240)
Display size         : WVGA(800x480)

e : Encoding
x : Exit
Select ==>
```

Input “e” and begin coding. Its length reaches 100 frame.

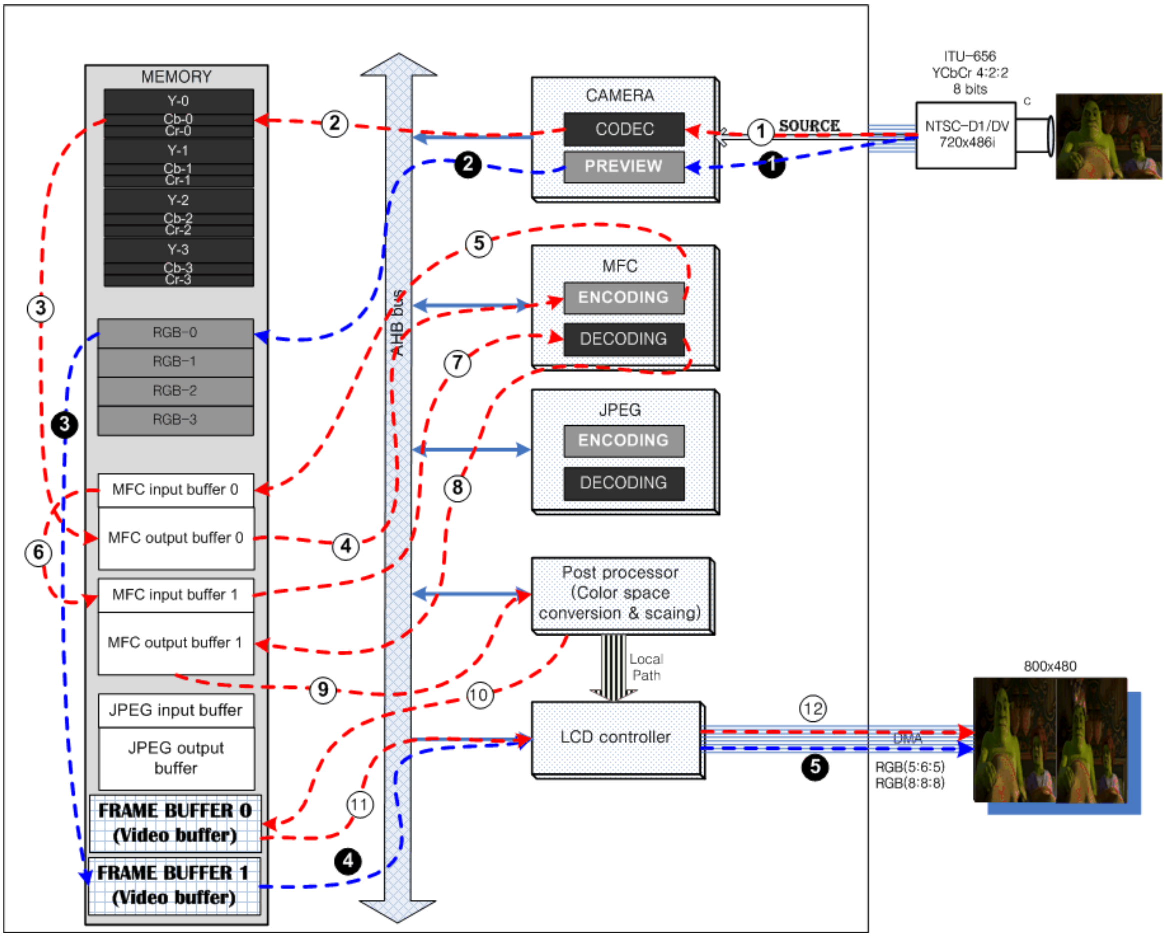
Input “x” to quit

The effect is as follows:



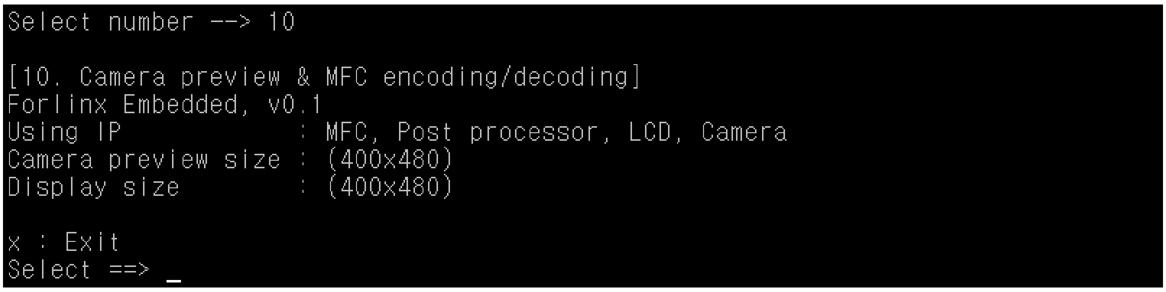
8-2-10 Camera preview & MFC coding and decoding

This program is used to execute camera preview, coding and decoding.



Input “10” to begin the test.

Note: If there is something unusual happened on the right part of LCD, please restart the test program.



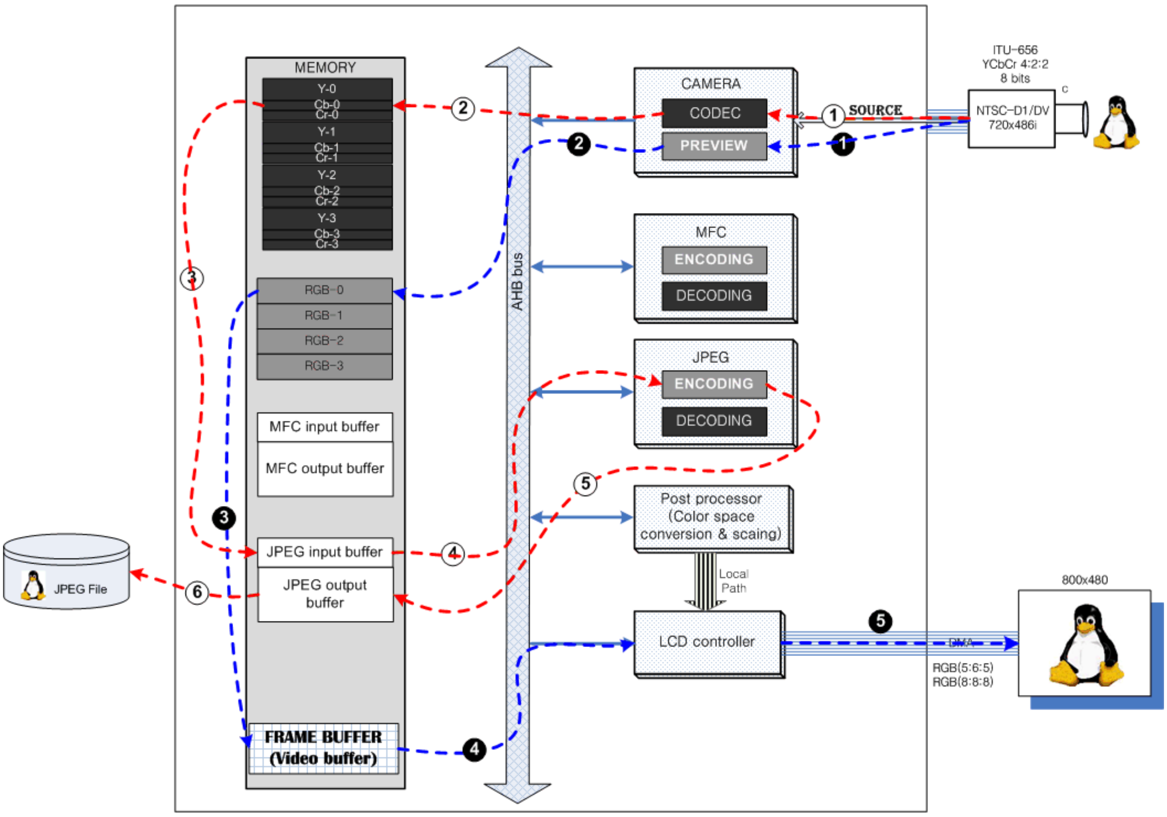
```
Select number --> 10

[10. Camera preview & MFC encoding/decoding]
Forlinx Embedded, v0.1
Using IP            : MFC, Post processor, LCD, Camera
Camera preview size : (400x480)
Display size        : (400x480)

x : Exit
Select ==> _
```

Input “x” to quit

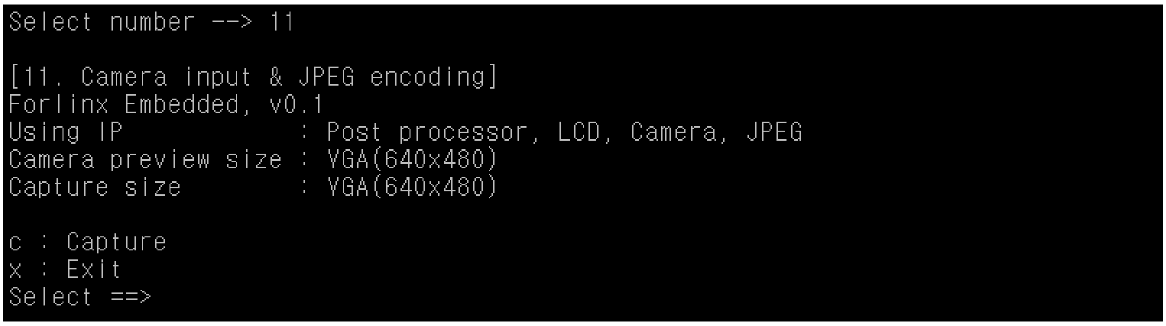
The effect is as follows: preview effect is on the right part, effect of coding and decoding is on the left side.

8-2-11Camera preview &JPEG decoding

This program is used for camera preview and could go on JPEG decoding for current frame.



Input “11” to begin the test.



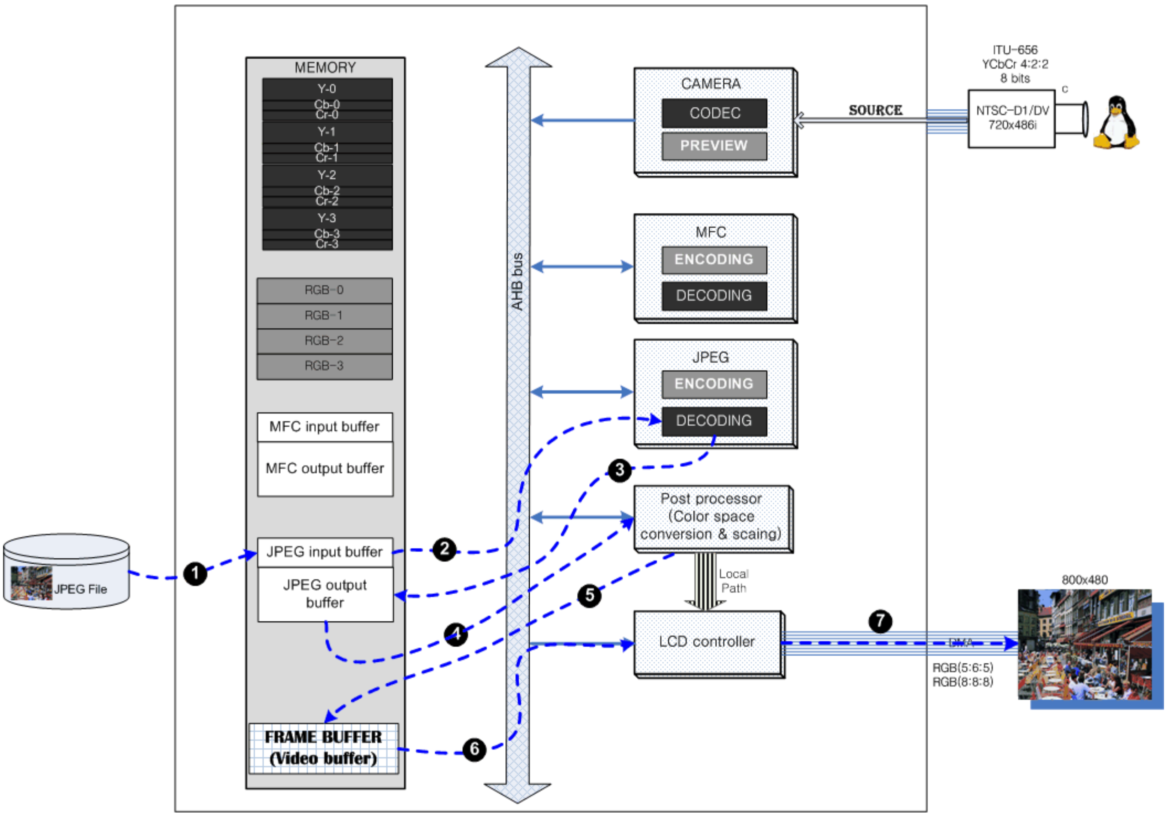
```
Select number --> 11

[11. Camera input & JPEG encoding]
Forlinx Embedded, v0.1
Using IP            : Post processor, LCD, Camera, JPEG
Camera preview size : VGA(640x480)
Capture size        : VGA(640x480)

c : Capture
x : Exit
Select ==>
```

Input “c” to capture a screen shot.

Input “x” to quit

8-2-12 JPEG decoding

This program is used for JPEG decoding and display them on the LCD.



Input "12" to begin the test., the effect is as follows:

8-3 Multimedia integration test 2

Above tests is operated depend on the source codes provided by Samsung,only inherent videos could be played,while AVI and MP4 files could not be played. We developed a new open source player which could broadcast files coincide with 6410 format by using 6410 DXVA function. the player has two version, respectively use command line and QT graphical interface in the operation, and both of them are open-source.

When broadcasting test videos, you need to copy and paste test videos into SD card and insert the SD card into the board. These test videos are in the multimedia test file folder in which have AVI files with H.264 coding format and MP4 file with MPEG4 coding format.

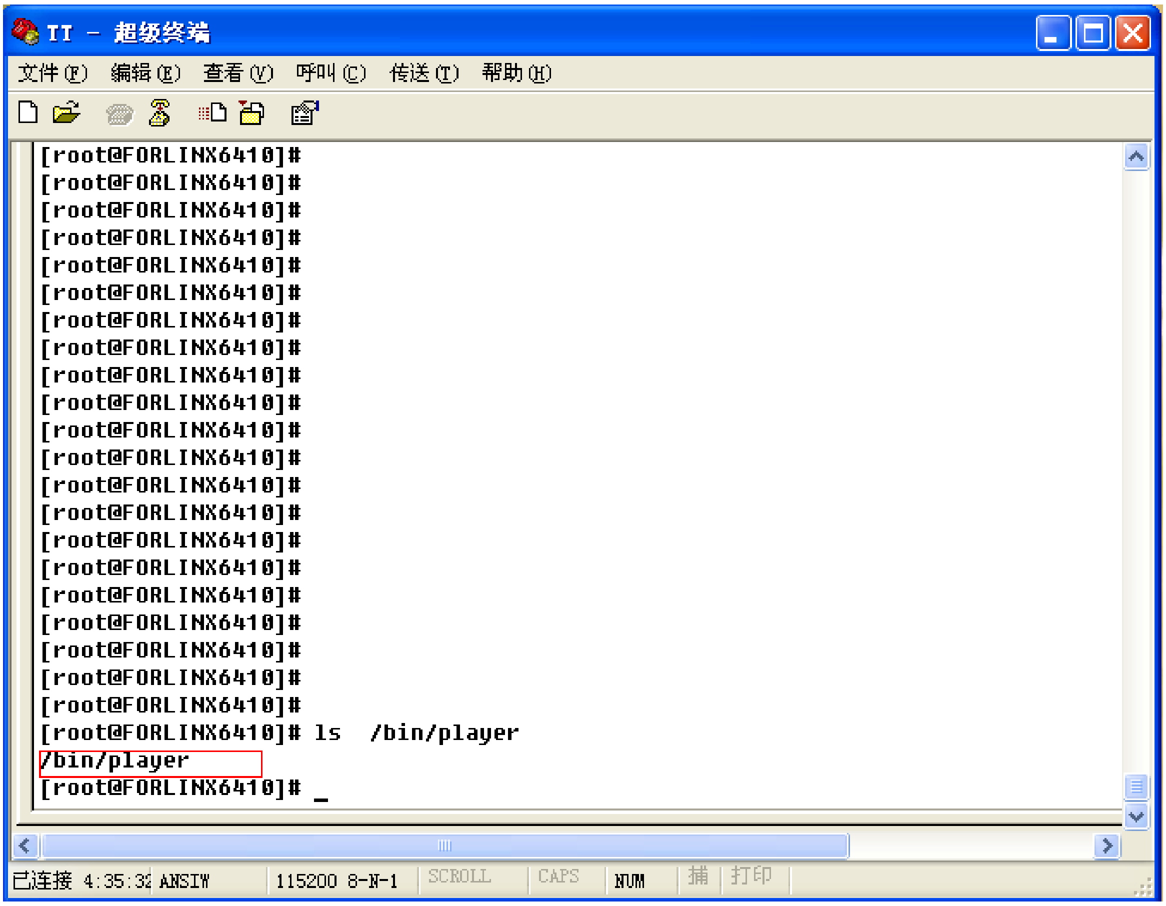
Note: AVI and MP4 videos are supported by 6410 CPU.if your multimedia files format need to be conversed to the format that is supported by 6410,conversion software will be introduced in the following chapters.

We will check the play effect in advance.

8-3-1 Command line open-source player

Player software is a kind of open-source software in the 6410 platform. Source code of the player is s3c6410-multiplayer.tar.gz which locates under the multimedia directory of the CD. This software could decode and play AVI and MP4 files depend on its 6410 DXVA function, you could download the latest version from Google Code, the download address: http://code.google.com/p/s3c6410-multiplayer/

Executable file player has been saved in the file system under the directory of /bin.this software is only suitable for the 4.3 inch screen.


TT - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
已连接 4:35:32 ANSIW 115200 8-N-1 SCROLL CAPS NUM 捕 打印

```
[root@FORLINX6410]#
[root@FORLINX6410]#
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[root@FORLINX6410]#
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[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]# ls  /bin/player
/bin/player
[root@FORLINX6410]# _
```
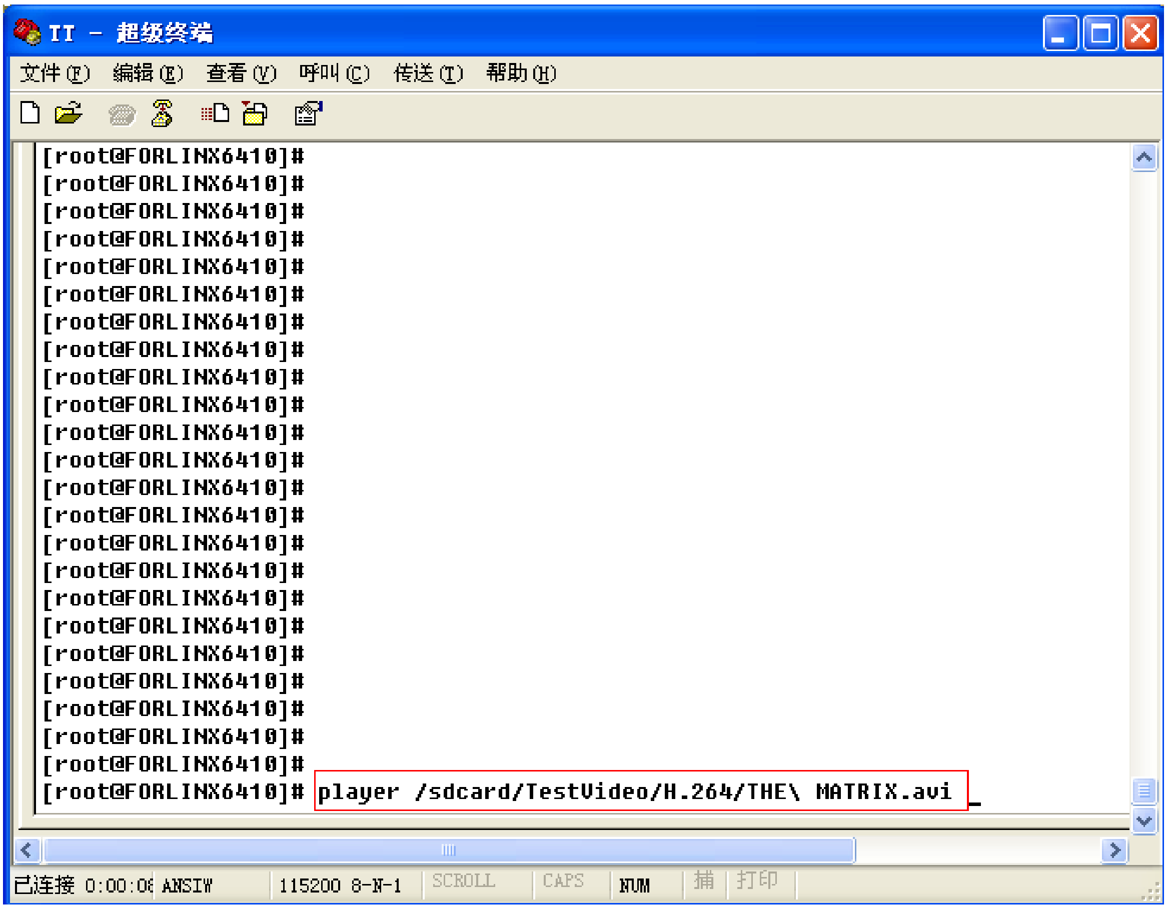

Broadcast AVI file, here plays the section of ”the matrix”



TT - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
已连接 0:00:08 ANSIW 115200 8-N-1 SCROLL CAPS NUM 捕 打印

```
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
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[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]# player /sdcard/TestVideo/H.264/THE\ MATRIX.avi _
```
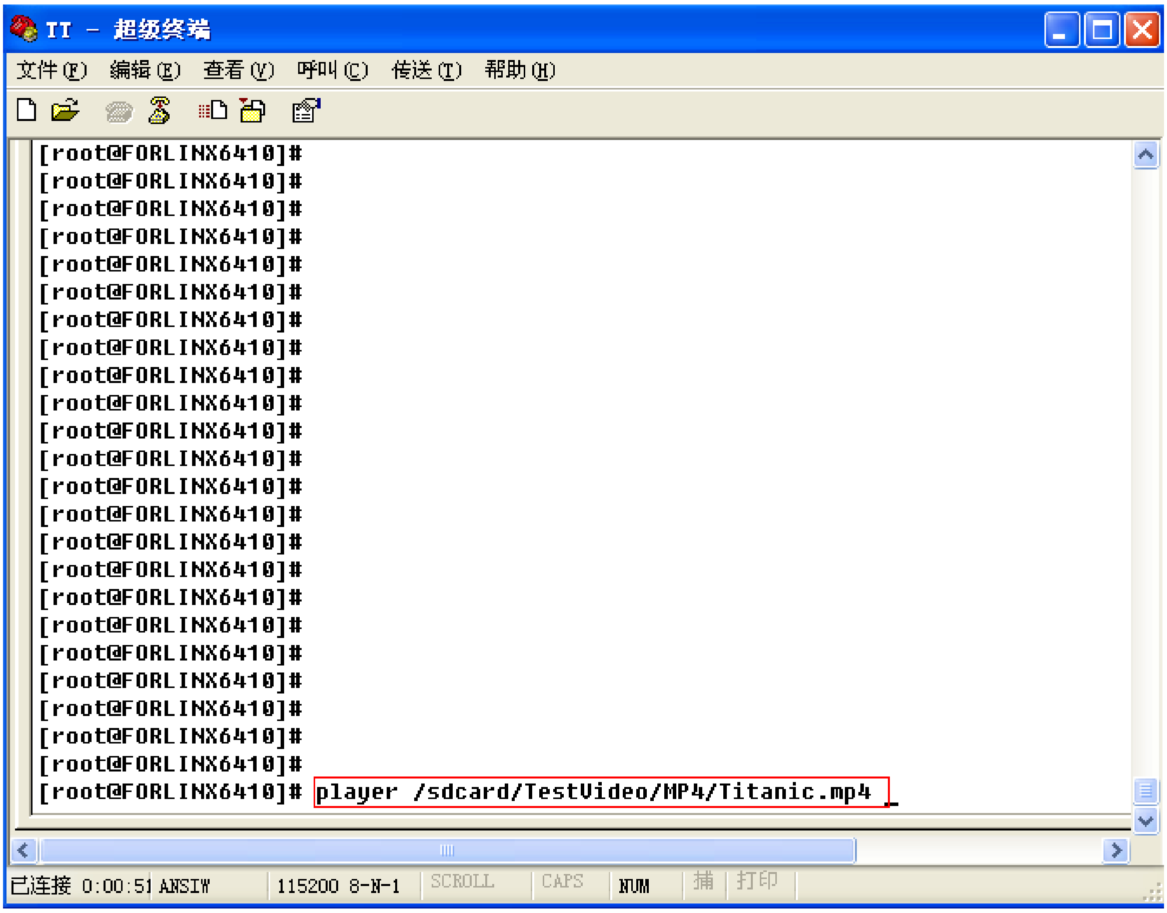

Play effect:

Broadcast MP4 files, here is the section of “The Titanic”.


TT - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
已连接 0:00:51 ANSIW 115200 8-N-1 SCROLL CAPS NUM 捕 打印

```
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
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[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]# player /sdcard/TestVideo/MP4/Titanic.mp4
```
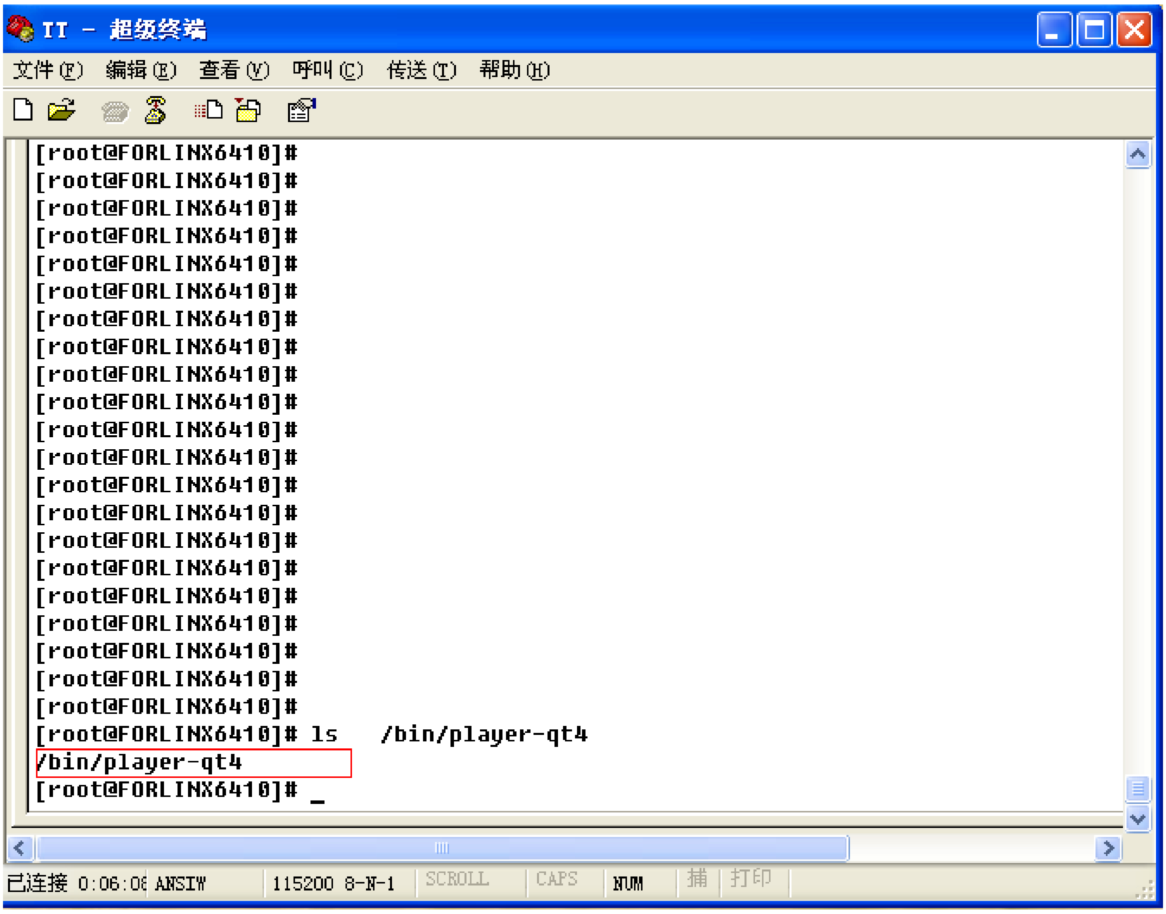

Play effect:

During the play, you could click different places on the screen to control the video play, such as pause, exit etc.

8-3-2 Qt graphical interface player-qt4

Player-qt4 is a player that combining Qt4.7 interface repository with the open-source player. The source codes of the player-qt4 could be found in CD, you could modify and use it at your will.the binary file of player –qt4 is prepared under /bin directory, moreover, player-qt4 only suit for 4.3-inch LCD.


TT - 超级终端
文件(F) 编辑(E) 查看(V) 呼叫(C) 传送(T) 帮助(H)
已连接 0:06:0€ ANSIW 115200 8-N-1 SCROLL CAPS NUM 捕 打印

```
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
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[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]#
[root@FORLINX6410]# ls   /bin/player-qt4
/bin/player-qt4
[root@FORLINX6410]# _
```
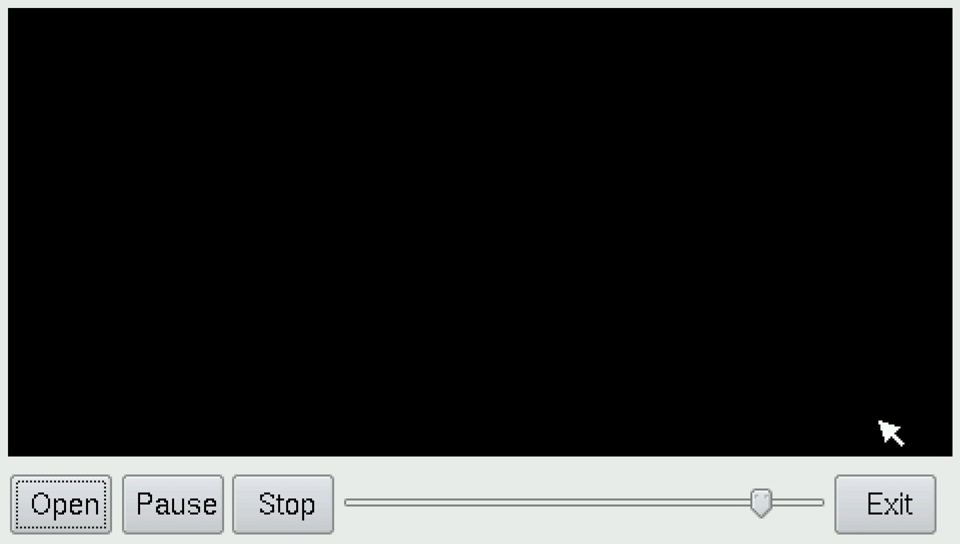
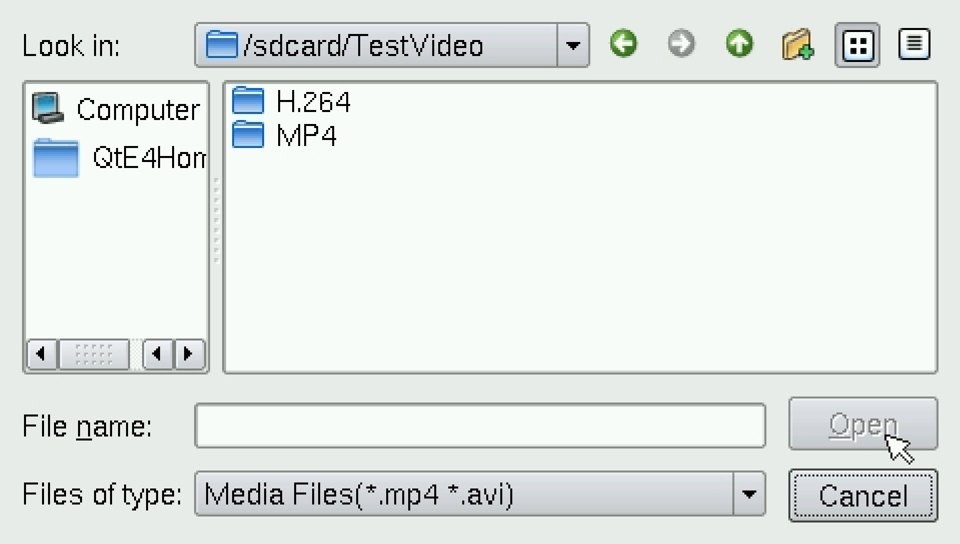

Run player-qt4, play interface will appear on the screen. The picture is as follows:



Click “open” to choose videos that you want to play.



File name:

Files of type: Media Files(*.mp4 *.avi)

You could click buttons on the interface to control the video play, such as pause, fast forward, exit.

8-3-3 How to converse ordinary multimedia file format to format which is supported by 6410 system.

Aimersoft iPhone Converter Suite software could converse multimedia videos to MP4 video format that could be played by 6410.MediaCoder software could be used to converse multimedia videos to H264 videos format that could be played by 6410. All test videos could be conversed through these two softwares.

Users could download latest version online, here we will not introduce it any more.